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VOL. XXXVII.

ENTOMOLOGY.

EXOTIC MOTHS.

BY JAMES DUNCAN,
M.W.S., ETC.

EDINBURGH:
W. H. LIZARS, 3, ST. JAMES' SQUARE;
S. HIGHLEY, 32, FLEET STREET, LONDON; AND
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1843.

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LATREILLE.

Latreille.

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ENTOMOLOGY.

VOL. VIII.

EDINBURGH:
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THE

NATURAL HISTORY

OF

EXOTIC MOTHS.

BY

JAMES DUNCAN,

M. W. S.

ILLUSTRATED BY THIRTY-FOUR COLOURED PLATES,
WITH PORTRAIT AND MEMOIR
OF LATREILLE.

EDINBURGH:
W. H. LIZARS, 3, ST. JAMES' SQUARE;
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* This genus nearly corresponds to that named *Erastria* by Curtis, but is designed to include the American species.

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Fac-simile of his Manuscript Notes, ditto.

In all Thirty-four Plates in this Volume.

ERRATUM.—In a certain number of impressions, Pl. XXIII. has been marked XXV.

MEMOIR OF LATREILLE.

As the names of Swammerdam, Linnæus, and Fabricius, have been respectively used to indicate particular epochs in the earlier stages of Entomology, so may that of Latreille be employed to signalize the most flourishing period of the science in more recent times. Almost from the date of his first publication till his death, his superiority in this department of Natural History seems to have been admitted by the general consent of all competent judges; every student was accustomed to look to him as a guide and instructor; and the most skilful, as well as the most inexperienced, have every where united in doing him homage as the "facile princeps entomologorum."

It is much to be regretted that no detailed biography of an individual so celebrated for his attainments in the branch of study to which he devoted himself, has yet been laid before the public. M. Audouin, an eminent student in the same department of science, has promised a historical notice

of Latreille for the Annals of the Entomological Society of France, of which he was the honorary president, but we are not aware that this has yet made its appearance. The following sketch will, therefore, be deficient in regard to the less important incidents of his life, which, in such cases, are seldom considered destitute of interest, although they have no immediate connexion with the causes of the individual's celebrity. Latreille lived in most eventful times, and it is not to be supposed but that many occurrences affecting his interests and the tenor of his life befell him besides those with which we have had an opportunity of becoming acquainted, and which might be well worthy of relation.

Pierre-André Latreille was born on the 29th November 1762, at Brives, a small town on the river Correze (a tributary of the Dordogne), in the department of the same name, which formed a part of the province of Limosin. His parents were descended from an honourable family; but their death left him an orphan at an early age, and apparently with very slender means of subsistence. Indeed he himself says that he seemed born to misfortune and obscurity. But the gentleness of his disposition, and attractive manners, secured for his boyhood several affectionate protectors, who did not relax their exertions in his favour till he was enabled, in some measure, to provide for himself. A medical practitioner in his native town, M. Laroche, took a

paternal charge of him, and Latreille was indebted to the friendship of this gentleman and his family for the comforts and amenities of a home. At a somewhat later period, a merchant of the same place, M. Malepeyre, showed him much kindness, and it appears to have been this generous minded individual to whom the merit is to be ascribed of first developing his taste for natural history. His love for it, which must have been deeply implanted in his nature, probably showed itself at an early age, and little more would require to be done than to fan the flame already kindled. This M. Malepeyre did by supplying him with books on the subject, and giving such instructions as he was competent to offer. That under the care of these and other friends who felt an interest in his welfare, must have been laid the foundation of a sound literary education, may safely be inferred from the proofs he afterwards gave of his proficiency.

Besides the individuals mentioned, another of his early patrons was the Baron d'Espagnac, governor of the Invalides, at whose request Latreille went to Paris when he was about sixteen years of age. Soon afterwards he had the misfortune to lose this friend, who loved him as a son, by death; but the loss was in considerable part supplied by a sister of the deceased, the Baroness de Puymarets, and his nephews, particularly M. Charles d'Espagnac. Through the influence of this family, Latreille was placed in the college of Cardinal Lemoine, where he continued for a length of time, prosecuting vari-

ous branches of education. While here, he had the good fortune to acquire the friendship and good offices of the celebrated crystallographer and mineralogist Haüy. Our sources of information do not supply us with any intimation as to his progress, during this period, in natural history; but there can be no doubt that he was attending to the history of insects, from the knowledge he soon after showed that he had acquired in that department.

He retired to the country in 1786, and during his residence there, devoted himself entirely and with the utmost zeal to the study of insects. The fruit of some of his researches appeared a few years afterwards in a Memoir on the Mutillas of France, insects belonging to the order Hymenoptera. This essay, which we believe to have been the first of his publications on Entomology, appeared in the "Actes de la Soc. d'Hist. Nat. de Paris," vol. 1, and it was not long in being succeeded by several others.

On the termination of his literary studies, it was designed by Latreille's friends that he should enter the church, and his education had been in some measure directed with that view. His constitution was not robust, and they probably thought that the tranquil duties of the sacred office were better suited to him than the active and laborious exertions required in most secular pursuits. It was little supposed that, in making such a selection, they were taking the very step which was destined at an after period to expose him most to persecution and outrage.

In 1788 he visited Paris, where he formed a friendship with many individuals of similar tastes with himself, of whom the most eminent were Fabricius, Olivier, and Bosc, afterwards his associates in the Academy of Sciences. The presentation of a few rare flowers to M. Lamarck was the means of introducing him to that eminent naturalist, and the warmest friendship ever after subsisted between them; so much so, indeed, that Latreille was in the habit of calling Lamarck his adopted father. The entomological memoir above mentioned, and his devotion to the science, which was now becoming known, procured him the honour, in 1791, of being elected a corresponding member of the Society of Natural History of Paris, and a short time afterwards, a similar mark of approbation was conferred on him by the Linnean Society of London.

About this time he was employed in drawing up various articles on entomology for that voluminous and valuable work, the *Encyclopédie Méthodique*. An article *Sur la variété des organs de la bouche des tiques*, appeared in 1795 in the Magazin Encyclop. (vol. iv. p. 15); and another, entitled *Mémoir sur la phalène caliciforme de l'eclaire*, in the same volume of that work. But it was not till 1796 that his independent career of authorship can be said fairly to have commenced, by the publication of a work which formed the basis, if we may so speak, of his future operations, and at the same time laid the foundation of the great fame he afterwards acquired. This was the *Precis des Caractères génériques des In-*

sectes, disposés dans un Ordre naturel, published at Brives in the year just mentioned. In order to make the design and merits of this work better understood, it may be desirable to say a few words respecting the state of entomological science when it made its appearance.

In the classification of insects, to which alone this work referred, there were several different principles at that time followed by different authors. Such of them as approved of Swammerdam's views, assumed the metamorphoses as the soundest basis of arrangement, and considered these to be the most important characters they afforded. A greater number adopted the opinion of Aristotle and Linnæus, and sought for principles of arrangement in the organs of motion; regarding characters derived from the immature or preparatory states of insects as unsatisfactory and of comparatively little value. Indeed, the arrangement of Linnæus, or the *alary* system, as it was sometimes called, recommended by its extreme simplicity and an admirable system of nomenclature, had been extensively adopted, and seemed so entirely to occupy the field as to preclude, at least for a time, the success of any rival. Although Fabricius found fault with these arrangements as founded too exclusively on the consideration of one point or one set of organs, he cannot be acquitted of having fallen into a corresponding error, by confining his attention too closely to the structure of the organs of the mouth. Yet the use he made of the diversities found in these parts is sur-

prising, enabling him to effect many important improvements, and give a more explicit definition of groups and genera, particularly the latter. The zeal with which he laboured, for upwards of thirty years, to render the classification founded on this basis as perfect as possible, travelling into most of the countries of Europe in order to examine collections and describe new species, as well as its intrinsic merits, all tended to give considerable celebrity to the Fabrician arrangement. *

But whatever merits these and other methods, into the consideration of which we cannot now enter, may possess, they are all artificial; or if at any time, in certain of their subordinate parts, they make an approach to the natural system, it is rather the result of accident than the object at which they aim. To Latreille almost exclusively is to be ascribed the praise of having applied the principles of the natural system to insects, and this he did for the first time in the work mentioned above. So early as 1689, the celebrated A. L. Jussieu had applied them, with the most fortunate results, to the vegetable kingdom; and others were labouring with the same view in several of the higher departments of zoology. † Indeed, the conviction had

* See Latreille's Life of Fabricius, in the Ann. du Mus. d'Hist. Nat., 1808, t. xi. p. 393.

† Among others, Scopoli, whose idea of a natural method in insects was well expressed so early as 1775: "Classes et genera naturalia, non sola *instrumenta cibaria*, non solæ *alæ*, nec solæ *antennæ* constituunt, sed structura *totius* ac cujusque vel

now become general among naturalists, that this was the only way in which the study of natural objects could be prosecuted with advantage. "The road, it is true," says Latreille himself,* speaking in reference to the natural arrangement of insects, "had already been traced by great masters, and the series of principal groups had been tolerably well established; but they had neglected the study of those relations of affinity by which these groups are connected; they had never compared the characters of the one with those of the other. Struck with this deficiency, I conceived the idea of uniting the genera into families, a project which I first carried into effect in my 'Precis des Caracteres,' &c. That was only a mere sketch, and I again took up the subject in a more extensive sense, and accompanied with all the détails of which it was susceptible." But the conception which our author had formed, even at the early period of which we speak, was a very accurate one; and although in several respects it was afterwards modified, some parts of it required nothing more than to be fully developed and applied. A pretty close resemblance can be traced to the Linnean system; and the Crustacea, Arachnides, and Myriapodes are included, as in the latter, among insects. The most important change

minimi discriminis diligentissima observatio." Intro. ad Hist. Nat., 1775, p. 401.

* Considérations Générales sur l'Ordre Naturel des Animaux composant les Classes des Crustacés, des Arachnides, et des Insectes. Paris 1810, 8vo.

in the classification of true insects, is the addition of Orthoptera to the orders of the Swedish naturalist; but the order *Aptera* of the latter is divided into the seven following:—

1. Suceurs. *Pulex.*
2. Thysanoures. *Lepisma* and *Podura.*
3. Parasites. *Pediculus* with the *Recini* of De Geer.
4. Acéphales. *Spiders, Scorpions,* and *Acari.*
5. Entomostracés. *Cypris, Daphnia.*
6. Crustacés. *Kleistagnathes* and *Exochnates,* Fabr.
7. Myriapodes. *Scolopendra, Julus, Oniscus,* &c.

The order Aptera was therefore entirely suppressed, but this had previously been done by Fabricius; and the most remarkable feature in the work was the selection of the characters on which the new orders were founded, and their division into natural families.* In fact it formed the germ of what was afterwards so fully developed in Latreille's various publications; and although, of course, completely superseded by these, it is still of great interest, when viewed in relation to the history of entomological science.

It has already been mentioned that Latreille was exposed to much persecution in consequence of being regarded as a member of the ecclesiastical body. The dates which we have incidentally given will at once apprise the reader that about this time the French revolution was at its height. All the

* Lacordaire's Introd. à l'Ent., tom. ii. p. 660.

restraints by which human beings are usually influenced, had now been completely thrown off,—

> ——— " and the giant Frenzy,
> Uprooting empires with his whirlwind arm,"

threatened to involve all that adorns humanity in one common ruin. Among the multitudes condemned to *deportation*, as it was called, Latreille was included, and sent to prison at Bordeaux, till the time should arrive for carrying his sentence into effect. The incident, in itself so trivial, by which he was saved from a fate to which so many others as innocent as himself became victims, has been often described, and it shows very strikingly on how small a point the most important events may turn. The surgeon who visited the jail where Latreille was confined, one day observed him carefully examining a small insect* which had found its way

* The insect in question is the *Necrobia ruficollis*. It was then esteemed rare, but is now known to occur not unfrequently in most parts of Europe, as well as in Africa and Asia. It is frequently found in Britain: I have seen it in the neighbourhood of Edinburgh, and have consequently described it in the *Entomologia Edinensis*, from which work I shall transcribe its generic and specific characters:—NECROBIA (from νεκρος *a carcass*, and βιος *life*, living on dead bodies). Antennæ the length of the thorax, the basal joint robust, the six following more slender, the third from the base rather longest, eighth, ninth, and tenth cup-shaped, increasing in width, terminal very large, quadrate, with the angles rounded, and the apex somewhat oblique: palpi with the terminal joint longest, fusiform-truncate: mandibles with a single tooth beneath the apex: thorax rounded quadrate: elytra oval, truncated at the base:

into his place of confinement, and upon making inquiry he was informed by the prisoner that the insect was very rare, and that he was desirous of sending it to two young naturalists then residing in Bordeaux. His wishes were complied with, and the insect was transmitted to MM. Dargelas and Bory de Saint-Vincent. Latreille's eminence as an entomologist happened to be previously known to these individuals, and they immediately exerted themselves in his favour, and that with such success, that he was ultimately released. He has gratefully commemorated this singular incident in more than one of his works. A figure of the insect is engraved on his tomb; and most of the entomologists of France preserve, in a conspicuous part of their cabinets, the NECROBIE-LATREILLE, in gratitude for the service it rendered to their master. Nay, the more sentimental of them, feeling even this to be an inadequate indication of the emotion of their hearts, have an inscription attached to it, intimating that they asked and obtained from the hands of their honoured master, the specimen ex-

tibiæ slender, without spines: tarsi four-jointed, the joints dilated and membranous at the apex; the unguicular one long and slender.

The species *ruficollis* is oblong ovate, covered with long hairs, shining: eyes and antennæ black: head blue-green, punctured: thorax somewhat quadrate, with the sides rounded, rufous, punctate: elytra rufous at the base, the rest greenish-blue, with eight punctured striæ on each, the interstices finely shagreened; thorax beneath and breast rufous, abdomen black; legs rufous.

hibited, in commemoration of so miraculous an event. *

Latreille incurred a similar danger in 1797, when he was again proscribed as an *émigré;* but the favour of his fellow citizens, and the influence of his friends, of whom he always had the good fortune to possess many, proved sufficient for his protection. The names of those influential individuals, to whom he owed his safety on this occasion, are General Marbot, Lachaize, judge of the courts of Cassation, and M. Malès.

The events of the Revolution caused him entirely to abandon his views towards the church; and he devoted himself, without restriction, to the prosecution of his studies in Natural History. He seems to have taken up his abode permanently in Paris in 1798; and was at first received with great kindness by M. Antoine Coquebert and his family. He was soon after nominated a corresponding member of the Institute, and on the strong recommendation of MM. Lamarck, Lacépède, Cuvier, and Geoffroy St. Hilaire, he was employed in the Museum of Natural History in the congenial task of arranging the insects. This brought him some small emolument, and the addition he made to it by writing numerous small works of a popular kind, sufficed for all his moderate wants.

It is not our intention to allude particularly in

* See Geoffroy St. Hilaire's Discours prononcés sur la Tombe de M. Latreille, Ann. de la Soc. Ent. de France, tom. ii. p. 21, *note*.

this place to all the works he published at different times; the very full list of them attached to the end of this biographical notice will indicate the extent of his labours, and prove useful, it is hoped, to the student who follows in the same track. Most of them appeared in periodicals, and all were received with great favour, as indicating extensive knowledge, sound and enlightened views, and no small degree of learning. The work which definitely fixed his reputation as the first entomologist of the age, was the well known *Genera Crustaceorum et Insectorum secundum ordinem naturalem in familias disposita*, &c. published at Paris in 1806–1809, in 4 vols. 8vo. It is a luminous exposition of the principles of natural arrangement laid down in his first work on the subject, and ever since its appearance has formed a principal guide to the student of Entomology. In this work the Linnean *Insecta* are divided into two groups or classes of equivalent value, *Crustacea* and *Insecta*, the former of which he characterises as possessing a heart and breathing by bronchiæ, and the latter as breathing by tracheæ. The class Insecta, the arrangement of which we shall give in a synoptical form as an example, is divided in the following manner:—

I. *Insects without wings. Aptera.*
  A. *With segments bearing seven or more pair of legs.*
    a. Head separated from the thorax.
      a. a. Four antennæ. Last segments of the body without legs . . Legion 1. *Tetracera.*
      b. b. Two antennæ. All the segments except the last with legs . . . . . 2. *Myriapoda.*
    b. Head connected with the thorax. No antennæ . . . . . 3. *Acera.*
  B. With three segments bearing legs . 4. *Apterodicera.*

II. Insects with wings . . . . . 5. *Pterodicera.*
  A. With elytra and wings. *Elytroptera.*
    a. With mandibles. *Odontata.*
      a. a. Wings folded transversely . . . . . Order 1. *Coleoptera.*
      b. b. Wings folded longitudinally . . . . . 2. *Orthoptera.*
    b. With haustellate mouth. *Siphonostoma* . . . . . 3. *Hemiptera.*
  B. Without elytra, but having wings. *Gymnoptera.*
    a. With mandibles. *Odontata.*
      a. a. Nervures reticulated . . 4. *Neuroptera.*
      b. b. Nervures ramose . . . 5. *Hymenoptera.*
    b. With haustellate mouth. *Siphonostoma.*
      a. a. Four wings covered with scales . . . . . 6. *Lepidoptera.*
      b. b. Two wings and two halteres . . . . . 7. *Diptera.*
      c. c. No wings or halteres . . 8. *Suctoria.*

Many parts of this arrangement must be allowed to possess the highest merit, but there are others to which this praise cannot be awarded, and of this the author himself seems to have been conscious, as he afterwards introduced material changes. "We may oppose to this arrangement," says Burmeister,* "which, as it does not regard the entire

* Shuckard's Trans. of his Manual of Ent., p. 610.

being of insects, is still merely artificial, that it is not sufficiently strict, for the order of the *Suctoria* is an apterous group, not in its right place among the *Insecta Pterodicera*. And also the groups which are here considered as equivalent to the *Tetracera*, *Myriapoda*, *Apterodicera*, and *Pterodicera*, are by no means of equal value, but the two first and two last are most closely allied; the former are the subordinate members of a higher group, and the latter also could at most be placed as equivalent to the orders of the *Insecta pterodicera*."

Before leaving this subject, it may be desirable to show briefly, in juxta-position with the above, some of the various changes our author afterwards made in his arrangement, for in every successive work important alterations were effected. In his "Considérations générales sur l'Ordre Naturel des Animaux composant les Classes des Crustacés, des Arachnides, et des Insectes," * the Linnean Insecta was divided into three equivalent groups, Crustacea, Arachnides (including the Insecta aptera of the former system), and Insecta. Such was likewise the arrangement which appeared in Cuvier's Règne Animal †, but the groups were differently defined, and some of the contents of each transferred to another. There was likewise the necessary addition of the order Strepsiptera, recently discovered by Kirby. After several other changes, of more or less importance, in different works, we come to that embodying his latest views, published in his "Cours d'Entomologie," ‡ which was completed only a short time before

* Paris, 1810, 8vo. † Paris, 1817. ‡ Paris, 1832, 8vo.

his death. Of this the following table will afford a pretty accurate view. The articulated animals are here designated by the common name of *Condylopes*.

I. APIROPODA. *Condylopes* with more than six legs.

Class 1. Crustacea.
2. Arachnides.
3. Myriapoda.

II. HEXAPODA. *Condylopes* with six legs.

Class 4. Insecta.

- Without wings.
  - No metamorphosis.
    - With mandibles, *Ord.* 1. *Thysanoura.*
    - With suctorial mouths . . . 2. *Parasita.*
  - Metamorphosis complete . . . . 3. *Siphonoptera.*
- With wings.
  - The upper covering the lower like a sheath. *Elytroptera.*
    - Gnawing insects.
      - Elytra corneous. Metamorph. complete. 4. *Coleoptera.*
      - Elytra corneous. Metamorph. incomplete. 5. *Dermaptera.*
      - Elytra coriaceous. Metamorph. incomplete. 6. *Orthoptera.*
    - Suctorial insects . . . 7. *Hemiptera.*
  - Wings alike. *Gymnoptera.*
    - Four wings.
      - Organs of the mouth formed for gnawing.
        - Wings reticulated. 8. *Neuroptera.*
        - Wings with ramose nervures. 9. *Hymenoptera.*
      - Organs formed for suction 10. *Lepidoptera.*
    - Two wings.
      - With moveable appendages on the prothorax. 11. *Strepsiptera.*
      - With halteres . . . . 12. *Diptera.*

Latreille became a member of the Royal Academy of Sciences in 1814, having succeeded his friend Olivier. His name was the first, as elected by the Academy, submitted to Louis XVIII. for his approbation, on his return to France. He was likewise, during the latter period of his life, elected an honorary member of most of the principal academies of Europe, established for the promotion of physical science. In 1821, the king evinced his regard for him, and the sense he entertained of the value of his services, by conferring on him the distinction of Chevalier of the royal order of the Legion of Honour. It was late, however, before he obtained such an appointment as his abilities and reputation may be considered as entitling him to hold. At last he was appointed to the Professorship of Entomology in the Museum of Natural History, a situation which completely realized all his hopes and satisfied his ambition. He devoted himself to the duties of this office with unwearied zeal, and engaged in numerous laborious works, at a time when his health was beginning to fail, and would have required almost entire cessation from labour.

One of the distinctions which he received towards the close of his life, and which he valued most highly, was that of being elected, under very flattering circumstances, Honorary President of the Entomological Society of France. This society may be said to have been formed, in a great measure, by his own pupils; those who had been attracted to the study, and guided in the prosecution of it by

his writings; and not a few of them enjoying the advantage of his personal intercourse and instructions. In any case, he was the individual to whom all eyes were necessarily turned, as most worthy of presiding over such an association; and he deeply felt the honour thus conferred upon him. "There are," he said, in his opening address to the Society, "certain days of happiness which Providence bestows on us, to console us for those others, alas! too numerous, in which we are tried by adversity. Such shall I always reckon that day on which I had the honour to preside over you. Yes, my dear associates, the remembrance of the proof you have given me of your esteem, in raising me to this presidency by your unanimous votes, will follow me to the tomb, and will alleviate the sufferings which are the fruit of my study and labours rather than of my years." He always manifested the deepest interest in the welfare of this Society, and exerted himself to the utmost of his power to further its ends; and nobly did the Society return, as we shall have occasion to show, the obligations it owed him.

His health was never robust, and for many of the last years of his life he suffered much from pain and debility. "His life," says M. Audouin, "had by no means been exempt from disappointment and sorrow; his wife having died several years before him, and being childless, he seemed condemned to a melancholy and insulated old age; but a niece who had been brought up by him, soothed his sufferings even to his last moment. He often told us

that, as being the object of the most assiduous and tender care, he was happy in spite of his sufferings and infirmities. This devoted affection was never for an instant relaxed, and he saw renewed, in his own case, that beautiful example of filial piety which he had so often witnessed in the same place which he himself inhabited in his turn. In fact, in the very same house, the tenderness of a daughter had prolonged the days of a blind and infirm father. This old man was De Lamarck, the friend of M. Latreille, whom he succeeded, and whom he called his adopted father, when taking a last farewell of him when he was on the brink of the grave."

But his increasing debility did not prevent him altogether from prosecuting his favourite occupation. In fact, several memoirs on insects, and no inconsiderable portion of his last work, the "Cours d'Entomologie," were written as he lay in bed propped up with pillows. Even in the beginning of the week on which he died, eager to withdraw his mind, if possible, from his sufferings by engaging in study, he corrected the proofs of his last production, namely, a description of a new genus of Crustacea, which he named *Prosopistome*. But this could not last; nature at length gave way, and he died on the morning of the 6th February, 1832, aged seventy years and three months.

Among the many individuals and learned societies who bewailed Latreille's death, the Entomological Society claimed the preference in doing honour to their late president. It was determined that the

coffin should be borne by the members of that Society, and M. Audouin was appointed to address the final *adieux* of the members to the illustrious deceased. The funeral took place on the 8th February. The bier was conveyed to the cemetery of Est (Père la Chaise), supported by the members of the Society; the Institute, the Administration of the Jardin-du-Roi, and the Entomological Society, were respectively represented by MM. Geoffroy Saint-Hilaire, Dulong, De Blainville, and the Count Lepeletier de Saint-Fargeau, who supported the corners of the pall. An immense concourse of naturalists and men of learning and science composed the cortège.

After the military honours, which were paid to the deceased as a member of the Legion of Honour, three discourses were pronounced over his tomb: the first by M. Geoffroy Saint-Hilaire in the name of the Institute, the second by M. Cordier in the name of the professors of the Jardin-du-Roi, and the third by M. Audouin for the Entomological Society of France. The following is a translation of that by the first-mentioned individual:—

"Gentlemen,

"Of the friend, the rival, and colleague of Lacépède, Lamarck, and Cuvier, nothing now remains to us but these ashes, already placed among these tombs where so much intellectual greatness has terminated. The loss of M. Latreille to zoological science, which he illustrated for so many years by the energies of his truly superior mind, has left

amongst us a great and irreparable blank; for pre-eminence of this nature is not a favour which Fortune grants twice to the same country in the course of the same century. With this first rank among the entomologists of our age, Fabricius, like another Elias, had invested the heir of his talents while alive, for I have heard this solemn designation from the mouth of the Professor of Kiel himself; and this acknowledgment of the superiority of my venerable friend, M. Latreille, confirmed by the universal assent of men of science throughout Europe, has been the solace of the latter portion of a life of so much diligence and useful labour; and how agreeable to him has been the just homage with which you, my fellow members of the Entomological Society, whom I have seen so affectionate and ardent in testifying your filial grief, have surrounded his latter days! You conferred inexpressible happiness on a heart which received the most delightful impressions from the regards of friendship, when you formed yourselves into a society, in the beginning of last year, under his honourable patronage, and surrounding your *Honorary President* as affectionate and devoted children, confidently and respectfully sought his distinguished guidance.

"At this moment of sorrow and regret, and when paying our final homage, it may be asked what could have been the commencement of a life the recollections of which henceforth belong to the history of the Sciences? Was M. Latreille called upon to derive celebrity from the fame of his relations, or to create it for himself? He has himself affirmed that fate

had destined him, from birth, to misfortune and obscurity, and he ascribed his first success to that protecting Providence, which happily raised up for him devoted friends and proctectors. We know that the attractiveness of his manners, when a child, obtained for him the regard and good offices of some generous citizens of Brives, his native place. M. Laroche,* a skilful medical practitioner, and his family, took an affectionate care of the young orphan; and after their example, a merchant of Brives (let us give the name of such a judicious and benevolent Mecænas), M. Malepeyre, took the warmest interest in him; lent him books on natural history, and never ceased to encourage and foster the rising taste which his young friend already showed for the science he was one day to illustrate. Let us hold this benevolent individual in honour. Perhaps had it not been for his mild and useful benevolence, France might not have had the honour of possessing the first of her entomologists!

"When he had terminated his literary studies, M. Latreille was intended for the church; it was hoped that the advantages of a calm and peaceable profession would thus be obtained for him; as it was, he was only delivered over to persecution and terror. Having been arrested at Brives, M. Latreille was sent to one of the prisons of Bordeaux, and there condemned to deportation. Afflicted with the same misfortunes as the illustrious Haüy, whom he had met in Paris and made his friend, Science

* An heir of the name and sentiments of M. Laroche was present at the funeral.

and its consolations in like manner became to him the avenue to safety.

" The medical attendant on the Bordeaux prisons was one day surprised to see a prisoner absorbed in the contemplation of an insect at a time when his life was in danger. ' It is a very rare insect,' M. Latreille replied to the questions he put to him; the insect was asked for and obtained for a naturalist of Bordeaux, then a young man of high promise, and now our fellow-member, M. Bory de Saint-Vincent. The latter, flattered by obtaining this gift from an entomologist whose name was already known by honourable works, undertook the task of liberating M. Latreille from the danger which threatened him, and soon had the happiness to see his exertions and those of their common friend, Dargelas, crowned with the most complete success. Latreille was restored to liberty and to Science. One trembles to think that, a month later, he might have perished with the companions of his misfortune, swallowed up by the waters of the Gironde. The deliverance was truly miraculous, if we refer to its cause, the accidental discovery of an insect; and our illustrious co-member has taken care to commemorate the circumstances in the most important of his works, the *Genera Crustaceorum et Insectorum.*

" A life so long exposed to agitation, at last obtained the means of settling, peaceably and happily, to literary labours. I shall limit myself on this occasion to mention their extent and high importance; what can I communicate to my present audi-

ence respecting writings which have become classical for the study of the science of which M. Latreille so long held the sceptre. Their number in 1822 exceeded eighty, and since that period how many other works, always worthy of the name of their author, have to be added to the list; among these I shall only name his co-operation in the *Règne Animal*, two volumes with which M. Cuvier had the good fortune to enrich his monumental conception.

" However, even all these entomological works were not sufficient to exhaust M. Latreille's indefatigable activity; his *Recherches sur le premier Age du Monde et l'Accord des Théogonies Phénicienne et Egyptienne avec la Génèse;* his *Dissertation sur l'Expédition du Consul Suétone Paulin en Afrique;* his *Considérations sur l'Atlantide de Platon;* finally, his *Vues sur l'Origine du Système metrique dans l'Antiquité et sur quelques Points de Geographie Ancienne*, would give M. Latreille the title to be considered one of our most distinguished philosophers, even if Entomology did not place his name above that of all other contemporaries.

" Society knew how to honour such eminent services. Our colleague attained to all the high stations connected with the subject in which he excelled. Since 1810, he was a member of the Academy of Sciences, then Professor of Entomology in the Museum of Natural History; almost all the academies of Europe were eager to obtain, as an associate, the eminent Naturalist, consulted and venerated by zoologists of every country as the supreme legislator in Entomology

" His simple and invariably kind manners gained him the hearts of all who approached him; it was his greatest delight to receive true proofs of affection, and to allow himself to give way to the lively and tender emotions of his heart. The intensity of his last sufferings had only the effect of exalting the ardour of his friendship and his paternal regard for his adopted children, * whose tender and devoted anxiety alleviated his last moments.

" Adieu, my learned and virtuous associate! adieu, the oldest of my friends! Your name will live in our memories with those of Lamarck and Cuvier, of whom you have been so long the worthy fellow-labourer, and with those of Reaumur and Fabricius, to whose renown you will add the equitable voice of posterity, thus confirming a judgment which you had the happiness to hear pronounced during your life-time."

The Entomological Society, immediately after the funeral, determined to raise a monument over the tomb; and for this purpose a subscription was entered into, not confined to the members, but open to scientific men of every description in all countries. Although there are a considerable number of members of the Society in Britain, of these the only names included in the subscription list are those of Kirby and Spence, and two sons of the latter. The necessary funds, however, were obtained, and the monument completed in the autumn of 1835. It

* Monsieur and Madame Valade-Gabel, his nephew and niece.

stands in the cemetery of Est or Père la Chaise, *pièce du Protestant*, 39th division, No. 90, and is placed near the margin of the path. It is in the form of a truncated obelisk, nine (French) feet in height, composed of a monolith of polished Chateau-Landon stone, resting on a pedestal of the same, and surmounted by a bronze bust of Latreille. The whole is surrounded by an iron railing.

On the front is the following inscription:

PETRUS ANDREAS
LATREILLE.
SCIENTIARUM ET ARTIUM
INSTITUTI GALLICI
SOCIUS
IN MUSEO PARISIENSI ENTOMOLOGIÆ
PROFESSOR,
ETC.
NATUS IN BRIVA-CURRETIA
XXIX. DIE NOVEMBRI
MDCCLXII.

PARISIIS OBIIT
VI. DIE FEBRUARII
MDCCCXXXII.

ENTOMOLOGIÆ PRINCIPI
PARENTES SODALES DISCIPULI
PRÆSIDIQUE SUO
ENTOMOLOGORUM GALLIÆ
SOCIETAS
EX ÆRE COLLATO
ÆDIFICAVERUNT.

The figure of an Egyptian Scarabæus (*Ateuchus sacer*) is placed at the commencement, and that of a Moth (*Saturnia Pyri*) at the end of the above inscription.

On the left face of the obelisk are the following words:—

Précis des Caractères des Insectes,
1797.*.
Genera Insectorum,
1806.
Règne Animal, Crustacés, Arachnides et Insectes,
1817—1829.
&c.

And on the right:—

Expedition de Suétone Paulin,
1807.
Notice sur les Sères et l'Atlantide,
1817,
&c. &c.

The bronze bust, which is of the natural size, has the name *Latreille* carved on its base. On one of

* It is not a little singular that an error in date should occur in such circumstances. The work mentioned was published in 1796. As the above inscription, however, is copied, not from the monument itself, but from the Ann. of the Ent. Soc. of France, the error may be typographical, as that work, unlike French scientific publications in general, is far from being accurately printed.

its sides is a highly magnified figure of *Necrobia ruficollis*, surrounded by these words: *Necrobia ruficollis Latreillei salus anno* MDCCXCIII.; and on the other *P. Merticux* 1833; the name of the sculptor whom M. Valade Gabel, M. Latreille's nephew, employed to make the model which the Entomological Society caused to be cast in bronze. *

A number of papers connected with the history of Latreille's life, &c. were enclosed in a double box of lead, and deposited in the foundation of the monument.

The inhabitants of Brives likewise intended to have a monumental structure, surmounted by a bust, erected there in honour of their distinguished townsman.

On the occasion of the bust of M. Latreille being presented to the Entomological Society by his nephew, M. Walckenaer, the president, delivered the following inaugural address, which, although some of the information it supplies has necessarily to a certain extent been anticipated, we have thought it advisable to give entire, both for its own sake, and as an example of a kind of oratory seldom practised in this country.

" Gentlemen,

" The only consolation we can obtain for the loss of a friend who was dear to us, is the opportunity of conversing about him with those

* An engraved representation of the monument will be found at the end of this Memoir.

who share in our grief, or who can at least understand it.

"On the occasion of the bust of M. Latreille being presented to you, I again congratulate myself on the honour of having been elected to preside at your meetings for the ensuing year, since I am thereby called upon to express, in your name, the satisfaction we all enjoy in contemplating the likeness of that individual whose works gave such an impulse to the science you cultivate. For the same reason I likewise become the medium of expressing your gratitude to the gentleman whose affectionate regard has enriched the place of your meeting with so precious an ornament.

"The sight of it reminds me of the well merited eulogium the individual it represents received from his associates in the Academy of Sciences, as well as from many of yourselves, and intimates to me in particular to be cautious how I add my own, which can neither possess the same authority nor be expressed with the same eloquence.

"But it may be affirmed that the highest panegyrics on M. Latreille, the most beautiful flowers that can surround his bust, or can be placed on his tomb, are those which it is in your power, gentlemen, to offer. It is your labours in the branch of human knowledge to which he owed his celebrity; it is your successful efforts daily to extend its boundaries, which confer more honour on the name and memory of this illustrious man than can be done by the best expressed eulogies.

"What, moreover, can I say to you respecting the works he has left, with which you are as well acquainted as I am myself.

"I should not certainly, in such a case, before other men and in the presence of any other assembly, have been silent respecting the works of genius which procure for this inanimate bust the honour of such an inauguration.

"But before conveying a full comprehension of the merits of him whom it represents, it would have been necessary to show the importance of the science, so much despised by the vulgar, to which he devoted his long and laborious life.

"I should have been obliged to point out how all the parts of natural history are incomplete without that of insects, not only because it is in itself the most considerable by the number of the individuals which it embraces, but also because it is connected with all the rest.

"It would have been necessary for me likewise to prove that it is at once the most difficult, the most extensive, and the most philosophical of them all; since it is it which shows the phenomena of life and all the mysteries of instinct under the most singular and varied aspects; since it is it which best reveals to our view the fecundity, power, and resources of Nature, along with its innumerable diversities in form and colours.

"I should then have to direct attention to the fact, that the greatest geniuses who have cultivated natural history; that those who have rendered their

names celebrated by the most useful discoveries in physics, medicine, and the practice of the arts; that the Swammerdams, Linnæuses, Geoffroys, Reaumurs, De Geers, and Fabriciuses, had been drawn by a particular attraction to this interesting study, in such a degree that many of them at last devoted all their time to it, and occupied themselves with it exclusively.

"It would then become my part to point out by what labours the indefatigable Latreille submitted all the observations of these great men to a new test,—a more exact and complete analysis; how prodigiously he added to the number of their observations; and how at last he succeeded in uniting into a body of doctrine such an immense number of facts, as to form at once a guide to the philosophical naturalist in this difficult department of science, and facilitate the study of all the authors who have treated of it.

"But such a demonstration is useless in reference to you, gentlemen, since it belongs to the history of a science with which you are familiar, and the annals of which you are daily continuing to enrich.

"However, although all of you know that Latreille was one of the most eminent men whom study has formed, you are not all aware that he was likewise one of the best whom Nature has made.

"Let one who has had the happiness to enjoy his friendship for the period of nearly forty years be permitted to pass upon him that simple eulogy. It

would, I am certain, be more satisfying to his heart than all those called forth by his genius or talent.

" Deprived by the first of our revolutions of the support of a noble and powerful family, whose protection he had acquired, and on which he had some claims by birth, Latreille was thrown alone into the world, in the midst of political tempests, without property or means of any kind, with a well finished education, an ardent passion for study, a quick and sensitive heart, and a delicate frame of body.

" Having escaped the proscription (who is there who has reached our times, after passing through these dreadful periods, without escaping the proscription oftener than once!) he was called, in a more favourable era to the Museum of Natural History to arrange the insects contained in that institution. He there found the means of perfecting himself in this branch of his studies, which he had always preferred to every other. In a short time he became in this department the competitor, then the rival, and finally the superior (not unquestioned although the fact was so undisputable) of those whom he called his masters.

" He must needs obtain books. Many had already been published in Germany on the science in which he excelled: the library of the Museum, now so rich, was then very poor, possessing very few on insects, and no additional ones were purchased. Latreille, whose slender appointments scarcely sufficed for his most urgent wants, wrought for the booksellers in order to procure for himself what was

necessary to extend the limits of the science to which he had devoted himself. He published various works on many branches of natural history, and likewise on geography. All these writings, although bearing marks of the rapidity with which they had been composed, display intelligence, a methodical mind, and great variety of knowledge. But the works treating of entomology always evinced his new and rapid progress in this science, until at last the publication of the *Genera Crustaceorum et Insectorum* placed him in the first rank of the entomologists of Europe.

" Thus, by his labour alone he was able to satisfy all his wants. In truth, his philosophy was such that he could be content with little; he indulged in no excess but for study, and this excess weakened his feeble constitution. He counteracted its bad effects by a frugality seldom practised, by an absence of all the pleasures of the world, including even those of society. But he was not on that account less feelingly alive to any thing, whether sad or joyful, which might happen to his friends, nor less obliging and kind to all.

" He was deeply afflicted at the calamities of his country; he detested wars, civil commotions, party animosity, and revolutions of whatsoever kind. Great catastrophes depressed his spirits, and made him nervous and unhappy, particularly in winter. He did not recover his vigour and freedom of mind until, on the return of spring, he could give himself up to the study of nature according to the manner

which pleased him best, that is to say, not in the galleries or *ateliers* of the Museum, nor in his own confined chamber, but in the boundless extent of the fields, in the woods and meadows. It was there, under the vault of heaven, that the greatest number and most valuable of his observations were made. It was on his return from these frequent and laborious excursions that he meditated on the relations of the creatures he had studied, hastening, as soon as he had entered, to verify anew and commit to writing the result of his thoughts and studies, which he did on the corner of a pretty large table, which he had scarcely ever time to put in order, and which was almost always encumbered with books lying in disorderly heaps, along with boxes of insects, pincers, magnifying glasses, and all the other implements of the entomologist.

" He spoke with difficulty, owing to a mal-formation of the lower jaw, which advanced beyond the upper; but his conversation was lively, instructive, and animated, indicating great sagacity, soundness of judgment, and, above all, a candid, sincere, and upright heart.

" He was late in obtaining an appointment, which at last secured him what every other person would have considered a position of moderate importance, but which was to him brilliant and splendid.

" Respexit tamen, et longo post tempore venit."

Like the old man in Virgil, he might likewise have reposed under the shade of his small possession, and

left to a young and skilful professor, already accustomed to supply his place, all the fatigues of instruction. After so many labours, no one apparently could have had any thing to object. But his delicate conscience would not allow him to enjoy all the advantages of a place without filling it. Perhaps also he was not insensible to the glory of this new career of professorship which was opened before him. In order to pursue it with sucesss, he engaged in extensive works, when his health, which had been for a long while much altered, would have required the most absolute repose. Then, also, a new and entire overthrow in the state, which no one had foreseen (not even those by whom it was brought about), gave him a new shock, and all these things combined, at last crushed the energies of a constitution already enfeebled by so much watching and fatigue. I shall here transcribe the last note I received from him, because nothing can show better the state to which he was reduced when he wrote his last work, and evince his prodigious perseverance, when he had set himself to the fulfilment of his duties.

" ' In order that my fellow-member and friend, M. Walckenaer, may consult my memoir on Bombyx, forming part of my Cours sur l'Entomologie, I have had a copy prepared of twenty-three leaves of the first volume of my lectures. This memoir commences at page 94 and terminates at page 115. M. Latreille will afterwards complete the copy. He entreats his confrère to excuse him for the many

mistakes and inaccuracies he will find in it. This work has been drawn up in the midst of the most cruel sufferings, moral as well as physical. His bed has served him for a table, and being unable to consult collections, he has been often forced to trust to his memory alone.'

" However, he has said in the same work (t. i. p. 132), ' I believe that I may affirm, without violating propriety, that I have given a proof of my devotion to science. More than half a century has elapsed since I began to cultivate it; but it has amply rewarded me for the efforts and sacrifices I have made on its behalf. There exists only one chair of Entomology in Europe, and I am the first who has filled it.'

" Yes, but the indefatigable labour of half a century was necessary to obtain it!

" Thanks to you, Gentlemen, Latreille could have said, at a later period, ' There exists only one Entomological Society in Europe, and I am the first who presided over it.'

" If it be true that the life of a man ought to be estimated only by the use he has made of it, that of Latreille is worthy of envy, since it was spent so worthily. Let us cherish his memory, and study his writings."

Latreille's Collection of Insects, which was extensive, was sold after his death. The Coleoptera were purchased by Mr. Noris of Manchester.

CHRONOLOGICAL LIST

OF

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* For this list, which we believe to be nearly complete, at least up to the date of 1822, we have been chiefly indebted to that excellent work the *Dictionaire des Sciences Medicales, Biographie*, under the word LATREILLE.

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Description d'une Larve et d'une Espèce inedite du Genre des Cassides;

Annales du Muséum d'Hist Nat. (t. i. p. 298).

Observation sur quelques Guèpes qui, quoique à peu près semblables, produirent des Nids tout à fait differens;

Ancien Bulletin de la Soc. Philom. (1803, t. iii. p. 147).

Tableaux méthodique des Reptiles, des Poissons, des Mollusques, des Anniledes, des Crustacés, des Insectes, et des Zoophites;

In the 24th vol. of the first edition of Deterville's Dictionary of Nat. Hist. (1804, 8vo.)

Observations sur l'Abeille pariétine de Fabricius, et Considérations sur le Genre auquel elle se rapporte ;

Annales du Muséum d'Hist. Nat. (1804, t. iii. p. 251).

Des Langoustes du Muséum d'Hist. Nat. ;

Annales du Mus. d'Hist. Nat. (t. iii. p. 388).

Mémoire sur un Gâteau de Ruche d'une Abeille des grandes Indes, et sur les Différences des Abeilles proprement dites, ou vivants en grandes Sociétés de l'ancient Continent et du nouveau ;

Annales du Mus. d'Hist. Nat. (1804, t. iv. p. 383).

Notice des Espèces des Abeilles vivant en grande Société et formant des Cellules hexagones, ou des Abeilles proprement dites ;

Annales du Mus. d'Hist. Nat. (1804, t. v. p. 161).

Genera Crustaceorum et Insectorum secundum ordinem naturalem in familias disposita, &c. Paris, 1806—1809, 4 vols. 8vo.

Notice biographique sur Jean-Chrétien Fabricius ;

Annales du Mus. d'Hist. Nat. (1808, t. xi. p. 393).

Mémoire sur le Genre Anthidie (Anthidium) de Fabricius ;

Ann. du Mus. d'Hist. Nat. (1809, t. xiii. p. 24).

Nouvelles Observations sur la Manière dont plusieurs Insectes de l'Ordre des Hymenoptères, pourvoient à la Subsistance de leur Postérité ;

Ann. du Mus. d'Hist. Nat. (1809, t. xiv. p. 412).

Considérations générales sur l'ordre naturel des Ani-

maux composant les Classes des Crustacés, des Arachnides, et des Insectes. Paris, 1810, 8vo.

Description des Insectes de l'Amérique équinoxiale recuillis pendant le Voyage de MM. de Humboldt et Bonpland;

Printed in the Natural History department of Humboldt's Travels, Paris, 1811.

Numerous articles in the Encyclopédie Methodique, conjointly with Olivier. 1811, 4to.

Mémoire sur un Insecte qui les Anciens réputaient venimeux, et qu'ils nommaient Bupreste;

Ann. du Mus. d'Hist. Nat. (1812, t. xix. p. 129).

Observations sur les Organes respiratoires des Cloportes;

Magasin Encyclop. (1815, t. i. p 80).

Description de certain Crabes de la Méditerranée, 1814;

Magasin Encyclop. (1816, t. i. p. 53).

Nouveau Dictionnaire d'Hist. Nat. All the articles on the Crustacea, Arachnides, and Insects. Paris, 1816, &c. 8vo.

Règne Animal de M. Cuvier, 3d vol. Paris, 1817, 8vo.

Introduction à la Geographie générale des Arachnides et des Insectes, ou des Climats propres à ces Animaux;

Mémoires du Mus d'Hist. Nat. (1817, t. iii. p. 37).

Considérations nouvelles et générales sur les Insectes vivant en Société;

Mémoires du Mus. d'Hist. Nat. (t. iii. p. 391).

Centuries des Planches de l'Encyc. Meth. Crustacés, Arachnides, Insectes. Paris, 1818, 4to.

Des Insectes peints ou sculptés sur les Monuments antiques de l'Egypte ;

Mémoires du Mus. d'Hist. Nat. (1819, t. v. p. 249).

Mémoires sur divers Sujets de l'Hist. Nat. des Insectes, de Géographie ancienne et de Chronologie. Paris, 1819, one vol. 8vo.

This volume contains his treatise *Du premier Age du Monde, &c. ; Dissertation sur l'Expedition du Consul Suétone Paulin en Afrique ; Observation sur l'Origine du Système métrique des Peuples anciens ; Notice sur les Peuples désignés anciennement sous le Nom de Sères,* &c. &c.

The following are likewise printed in the Mémoires of the Museum of Nat. Hist. :—*De l'Atlantide de Platon ; Considerations générales sur les Insectes vivant en Société ; De la Formation des Ailes des Insectes.*

Passage des Animaux invertébrés aux vertébrés. Paris, 1820, 1 vol. 8vo.

Rapport sur deux Ouvrages manuscrits de M. Savigny, présentés à l'Académie des Sciences ;

Memoires du Mus. d'Hist. Nat. (1820, t. vi. p. 93).

Des Rapports généraux de l'Organisation exterieure des Animaux invertébrés articulés, et comparaison des Annélides avec les Myriapodes ;

Mémoires du Mus. d'Hist. Nat. (t. vi. p. 116).

De quelques Appendices particuliers du Thorax de divers Insectes ;

Mémoires du Mus. d'Hist. Nat. (1821, t. vii. p. 1).

Affinités des Trilobites ;
Mémoires du Mus. d'Hist. Nat. (t. vii. p. 22).

Des Habitudes de l'Araignée aviculaire ;
Mémoires du Mus. d'Hist. Nat. (t. vii. p. 456).

Origine et Progrès de l'Entomologie ;
Memoires du Mus. d'Hist. Nat. (t. vii. p. 461).

Recherches sur les Zodiaques Egyptiens. Paris, 1821, 8vo.

Various articles in the first vol. of the Dict. Class. d'Hist. Nat. Paris, 1822.

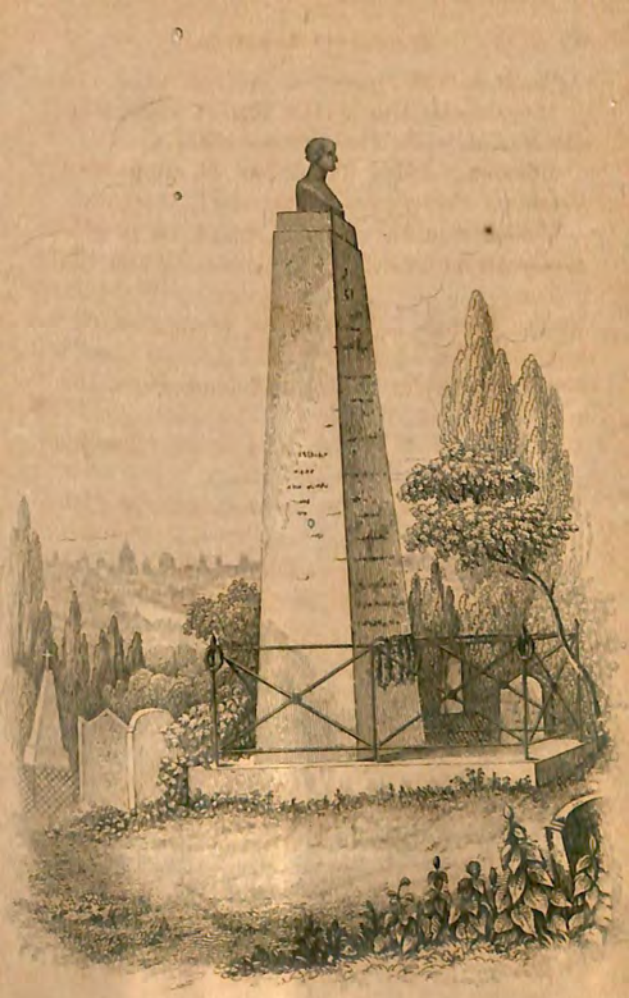
Familles naturelles du Règne Animal. Paris, 1825, 8vo.

Règne Animal de M. Cuvier, nouv. ed. 2 vols. on Insects, Paris, 1829.

Cours d'Entomologie, 8vo. *with an Atlas of Plates,* Paris, 1832.

Distribution methodique et naturelle des Genres de diverses Tribus d'Insectes Coléoptères, de la Famille des Serricornes ;
A posthumous publication, in the third vol. of the Annales de la Société Entomologie de France. Paris, 1834.

Besides the above, various memoirs appeared in different periodicals, between the years 1823 and 1832, which we have not at present the means of enumerating.



LATREILLES TOMB.

in the Cemetery of Père la Chaise.

Donacia.

Labre transversal, cornu.
mandibules terminées par 2 dents
Antennes par trois articles
Yeux plus courts
Palpes courts, presque de
la même longueur.
Le dernier article filiforme.
Corps cylindrique, oblong.
Celui des femelles plus renflé.
Pieds.
Mâchoires à 2 lobes.

Lèvre inférieure cornée.

Languette presque carrée
membraneuse
avancée
au milieu

† La languette semble être
formée de 2 membranes appliquées
l'une contre l'autre. Elle paroit
l'autre palpe. Elle grande, membra-
neuse et échancrée au bout,
espèce de palais appliquée
sur la lèvre.

Fac simile of one of Latreilles Mss notes
illustrative of the generic Characters of Insects

INTRODUCTION.

When describing British Moths and Hawkmoths in a former volume of this series, such a considerable space was devoted to the general history of these tribes, that it is not necessary again to enter into it, at any length, on the present occasion; while, at the same time, the peculiarities of the order Lepidoptera, of which they form a part, have been amply detailed in the two other volumes which treat of that subject.

Exotic moths compose by far the most extensive portion of the lepidopterous order; and notwithstanding the immense number with which we are already acquainted, there is every reason to believe that a large proportion still remains unknown to us, especially of the smaller species, which travellers in foreign lands have for the most part wanted either the opportunity or inclination to investigate. When compared with those of our own country, as strongly marked a contrast in regard to size is observable, as we had formerly occasion to point out between our native and foreign butterflies. The Atlas Moth of

China (sometimes measuring nearly a foot between the tips of the expanded wings) and the Great Owl Moth of Brazil, even further surpass the dimensions of our largest indigenous species, than the Ornithopteri do any of our day-fly tribes. Indeed, the two insects named must be regarded as the largest Lepidoptera known, and there are not a few others which make a pretty near approach to them in this respect. Some of those which indicate by their structure some relationship to the Sphinges and Hesperian butterflies, are ornamented with very brilliant colours; but in general the same subdued and occasionally sombre tints prevail, which we witness among our native moths. Great diversity of form and appearance may be expected among a race of insects of such extent and varied economy: it is strikingly observable in the perfect insects, but the caterpillars vary in form, colours, clothing, and appendages almost without end.

It is a subject of regret that our acquaintance with the caterpillars of exotic moths is still so limited, although it is not difficult to account for the fact. It is by no means an easy matter to preserve them, at least in such a way as to retain their forms and colours in any degree of perfection. The greater number of individuals who take an interest in the subject are, moreover, only casual visitors to the countries where they make their collections, and they have neither time nor opportunity to rear the caterpillars till they disclose their moths; and unless this step be taken, the possession of the former is of

comparatively little value. To this may be added, that the caterpillars are often difficult to discover, owing to the nature of their haunts, many of them living in the interior of trees, within the substance of herbaceous vegetables, in fruits, &c. But the want of this knowledge, from whatsoever causes it may arise, has hitherto been a principal cause, and will probably long continue to be so, of preventing a natural arrangement of this tribe being effected; and the observation of Latreille will in all likelihood long continue to be applicable,—" Nepotes nostri methodum optimam soli conficient."

Before referring to a few of the principal methods in which it has been proposed to arrange the nocturnal Lepidoptera, it will be of advantage to take a slight glance at some of those authors who have contributed most to extend our knowledge of exotic species, and from whose works the materials must be principally derived to form the basis of these arrangements.

The works relating to the nocturnal Lepidoptera of Europe are numerous and valuable. One of the most extensive and useful is the " Die Schmetterling von Europa," by Ochsenheimer and Treitschke, in 14 vols. 8vo. Leipzig, 1807—34. Godart has described the species indigenous to France; Duponchel has continued the work, and given an Iconography of the Caterpillars (Paris, 1832, 8vo.). Hubner, Dennis and Schiffermüller, Boisduval, and many others, have likewise made valuable contributions to the subject, in reference to its relations

to Europe;* but it is of the authors who have treated of extra-European Lepidoptera that we wish at present more particularly to speak.

The splendid work of Madame Merian on the Insects of Surinam, published in 1705, may be regarded as the first illustrated work of any consequence devoted to exotic entomology. About one-half of it is occupied with the crepuscular and nocturnal Lepidoptera; and several of the most conspicuous kinds of the tropical parts of the New World are represented, such as *Attacus erythrinæ*, *Erebus strix*, *Attacus aurota*, *Hesperus*, &c., besides numerous species of *Sphingidæ*. Viewed in relation to its merits as a work of art, this publication is deserving of high praise; the objects are gracefully grouped and distributed, and great freedom and power of drawing is often displayed. But it derives its chief value in the eyes of naturalists from the figures of the caterpillars, which are almost always given, and generally executed with much greater care than those of the perfect insects. A few glaring errors into which the fair authoress has fallen, have, it is true, produced some degree of doubt as to the fidelity of her representations; but in general there is no reason why they should not be relied on. Many caterpillars are to be found here, for which we should look in vain in any work of more recent date. It is to be lamented that the

* A very full list of the writers on European Lepidoptera will be found in Westwood's Modern Classification of Insects, vol. ii. p. 303.

text is so meagre, and an unworthy accompaniment of the plates which it professes to explain. For this, however, we are not to blame the writer, Caspar Commelin, whose Latinity is excellent; the lady, engrossed with her drawings, had failed to supply him with the requisite materials.

As an entomological artist, very few have excelled Roesel, and at the time his work appeared (1746—1761) it was unequalled for the truth and beauty of its figures. These were chiefly devoted to the illustration of the other tribes, although not a few foreign moths are also represented, accompanied, in several instances, with figures of the caterpillar and chrysalis. The faithfulness and delicacy of these delineations must have exercised a very beneficial effect on the arts as applied to this subject, by affording a high standard wherewith subsequent artists might compare their productions. Roesel engraved the plates, as well as executed the drawings, with his own hand,—a combination of skill which seems almost indispensable to high excellence in this difficult department.

A most valuable contribution to the history of exotic Lepidoptera appeared in 1770, when Drury published the first volume of his Illustrations of Natural History. A second appeared in 1773; the third and last in 1782. The whole work contains representations of a great number of crepuscular and nocturnal Lepidoptera, many of which were previously unknown, and a few continue to be unique even to the present day. Most of the figures are

from drawings by Moses Harris,* by far the best painter and engraver of such subjects in his day, and likewise a man of original observation, and warmly attached to the study of insects. Dru Drury was a London goldsmith, in good circumstances, who expended much time and money in prosecuting this study. He purchased almost every collection of any value that could be obtained, and contributed largely to defray the expenses of various individuals who were sent to different countries, principally for the purpose of collecting objects of natural history. The collection amassed by such means became of great extent and value; containing upwards of eleven thousand species and varieties, of which little short of three thousand were Lepidoptera. "There may be in Holland," says Drury himself, in one of the printed circulars which he distributed with a view to its sale, "collections more numerous (having in many instances a great number of single species), yet no collection abounds with such a wonderful variety in all the different genera as this. All the specimens of which it is composed are in the highest and most exquisite state of preservation such an extensive collection can be supposed to be, and a very considerable number are *unique*, such as are to be found in no other cabinet whatever, and of considerable value; many of which, coming from countries exceedingly unhealthy, where the collectors, in procuring them,

* All the plates of the two first volumes are by Harris, but some of those in the third volume are by a different hand.

have perished from the severity of the climate, give but little room to expect any duplicate will ever be obtained during the present age; and the learned quotations that have been taken from it by those celebrated authors Linnæus and Fabricius in all their late editions, are incontestable proofs of the high degrees of estimation they entertained of it." The work, which embodied many of the rarities of this collection,* derived its principal value from the plates, which are greatly superior to any thing of the same kind that had previously appeared in this country; the descriptions are of little value, and intended, as Drury himself states, merely to *assist* the reader in observing the figures; but the localities are indicated with some care, and the trivial names of Linnæus to a certain extent applied, being the first attempt of the kind made in this country. The original deficiencies of the text, however, are now amply made up, and a high degree of value imparted to the work, even in the present state of the science, in a beautiful edition published three years ago under the editorial superintendence of Mr. Westwood, who has added much additional matter, and given, wherever practicable, an account of the different states of the species, in which the original work was wholly defective, not a single lepidopterous larva being either figured or described. This work, therefore, has on two separate occasions been of important service to the history of the noc-

* The collection was ultimately brought to the hammer and dispersed (May 23, 1805), realising the sum of £614 8s. 6d.

turnal Lepidoptera (the only light in which we are now considering it): in its original form, by supplying excellent delineations of many fine species; and in its recent and improved shape, by its accurate descriptions, augmented historical details, and modernised nomenclature.

Cramer's "Papillons Exotiques des Trois Parties du Monde, l'Asie, l'Afrique, et l'Amerique," is one of the most valuable works ever published on the Lepidoptera of foreign countries. The first volume appeared at Amsterdam in 1779, and the fourth or last in 1782. It is large quarto size, containing four hundred plates, which, besides butterflies, afford representations of between eight and nine hundred moths and sphingideous insects, including many of the largest and most remarkable kinds found out of Europe. The engravings, upon the whole, are very accurate, and the colouring so good that the species can be at once recognised. These figures derive additional value from the consideration that they have been very often referred to by describers and systematists, so that we can easily determine what insect they meant when their descriptions, as often happens, prove so brief or imperfect as to leave us in doubt. The accompanying text is not of so much value as it might easily have been made, but a good deal of useful information may be gleaned from it. A supplement to this work has been published by Stoll (1791), which is deserving of the highest commendation. It contains figures of upwards of seventy moths and hawkmoths; but its

most interesting feature consists of the representations of a great number of the caterpillars of exotic species, most of which had been figured by Cramer in the perfect state. These caterpillars are extremely well engraved and coloured, and afford singular examples of the variety and strange configuration of parts and appendages to be found in this department. Their accuracy may be depended on, as they were drawn from life by a skilful artist, and were traced through their various metamorphoses in their native country. The greater number of them are from Surinam.

Six years subsequently to the date of the voluminous work of Cramer, another appeared in this country, devoted to the rare Lepidoptera of Georgia, by John Abbot and Sir J. Edward Smith. Of this magnificent publication it is not easy to speak in terms of too high commendation. The drawings were made by Abbot, who was a first-rate entomological draftsman; Sir J. E. Smith superintended the arrangement, and John Harris engraved the plates: such co-operation could scarcely fail to produce valuable results. Abbot was sent to America for the express purpose of examining and collecting its insect productions, his expenses being in part defrayed by a few naturalists in this country, who looked for remuneration in the remittance of specimens and the general advancement of the science to which they were attached. In prosecution of this object he traversed many parts of the United States, and ultimately settled in Georgia, whence he trans-

mitted many fine specimens of insects to private individuals in Britain, as well as to public museums both here and on the continent. " Abbot's specimens were certainly the finest that have ever been transmitted as articles of commerce to this country; they were always sent home expanded, even the most minute; and he was so watchful and indefatigable in his researches, that he contrived to breed nearly the whole of the Lepidoptera. His general price for a boxful was sixpence each specimen; which was certainly not too much, considering the beauty and high perfection of all the individuals. Abbot, however, was not a mere collector. Every moment of time he could possibly devote from his field researches, was employed in making finished drawings of the larva, pupa, and perfect insect of every lepidopterous species, as well as of the plant upon which it fed. These drawings are so beautifully chaste and wonderfully correct, that they were coveted by every one. So many, in fact, applied for them both in Europe and America, that he found it expedient to employ one or two assistants, whose copies he retouched; and, thus finished, they generally pass as his own. To an experienced eye, however, the originals of the master are readily distinguished. M. Francillon possessed many hundreds, but we know not into whose hands they have now passed. Another series of one hundred and three subjects, not included in that which has been published, was executed for us, with the intention of forming two additional volumes to those edited

by Dr. Smith; but the design is now abandoned. The healthy and peaceful occupations of this meritorious entomologist has led to great length of life; for we had the pleasure of receiving a collection of insects from him only two years ago. He is probably now above eighty." *

This splendid work is in two large folio volumes, and contains one hundred and four plates, of which no fewer than eighty are devoted to the crepuscular and nocturnal Lepidoptera. In almost every instance both sexes are figured, along with the larva, and the plant it frequents. There are no descriptions; and rather a paucity of details regarding the general history of the respective species. It deserves, notwithstanding, to occupy a very high place among the illustrated works which have advanced our knowledge of the tribe of insects of which we are now treating.

The various works of Donovan on the insects of China, India, and New Holland, although chiefly occupied with other tribes, furnish not a few highly finished delineations of beautiful and interesting moths from these several countries. They were published at intervals between the years 1799 and 1805.

For originality, pains-taking, and a successful elucidation of the subject taken in hand, few works surpass the small publication of J. W. Lewin on the lepidopterous insects of New South Wales. It forms a thin quarto, with nineteen plates, engraved

* Swainson, Lard. Cyclop., vol. cxxvi. p. 99.

by the author. It was designed to be the precursor of several other works on the natural history of that country and of Otaheite, where the author spent nearly eight years, and was published in the hope that the profits of the sale would enable him to return to his native country; a prospect, however, which was unhappily not realised, for he died at Sidney in 1821. The work is now extremely rare, and it is probably on that account that the interesting groups which it describes have not much attracted the attention of recent entomological writers.

The extensive works of Hubner and Herbst deserve a conspicuous place among the illustrated works devoted to the Lepidoptera, and there are many others of great merit which we cannot afford space more particularly to advert to.

Of those authors who have arranged the heterocerous Lepidoptera systematically, it is scarcely necessary to allude to the well known classifications of Linnæus and Fabricius. The former at one time included the whole in his genus Phalæna, but he afterwards added the genus Sphinx, and divided Phalæna into numerous sections. Latreille was the first who attempted a natural arrangement, which appeared in 1796, in the "Precis," &c. of which we have already spoken. Following out the views of Mr. Macleay with regard to a circular relation of affinities, several British authors have endeavoured to apply his principles to the insects in question. Mr. Stephens, the author of one of the best de-

scriptive works on British entomology we possess, divides the whole of the sphinges and moths into five primary groups, viz. Crepuscularia, Pomeridiana, Nocturna, Semidiurna, and Vespertina, and the following table is designed to show the degree of relationship subsisting between the different families, the diurnal tribes being likewise introduced to indicate the connexion. *

Ægeriidæ : Sesiidæ. Papilionidæ : Nymphalidæ.
II. Sphingidæ : Hesperiidæ. I.
Zygænidæ. Lycænidæ.

Notodontidæ : Hepialidæ. Geometridæ : Platypterigidæ.
III. V.
Bombycidæ : Arctiidæ. Pyralidæ.

Lithosiidæ : Tineidæ. Tortricidæ.
Noctuidæ. IV. VI. Yponomeutidæ.
Pterophoridæ.

Mr. Newman has likewise attempted a circular arrangement, of a more elaborate character than the above, assuming seven to be the typical number of groups, which will be found explained in his work entitled "Sphinx Vespiformis."

Most of the classifications hitherto alluded to, as well as many others which it is unnecessary to describe, as they present no very remarkable feature, are founded more or less exclusively on the perfect insects. There are others, however, which have acquired some celebrity, which may be said to run

* Systematic Catalogue of British Insects, Intro. p. x.

into a corresponding error, by taking the peculiarities of the caterpillar and metamorphoses too much into account, to the entire neglect of the mature forms. The most remarkable of this description is that of Dennis and Schiffermüller, published anonymously at Vienna in 1776, founded exclusively on the caterpillar. It attracted little attention in this country till a comparatively recent period, when considerable prominence was given to it by Dr. Horsfield, who adopted a similar method, and applied it to the Lepidoptera of Java. Nearly all the groups, indicated and named by the authors above mentioned, have since been established as genera. The following is a view of their system, as far as it applies to sphinges and moths, with the names of the modern genera attached.*

Sphinx is divided into seven families:—

A. Larvæ acrocephalæ. *Smerinthus ocellatus.*
B. ..... amplocephalæ. *Sphinx convolvuli.*
C. ..... maculatæ. *Dielephila Euphorbiæ.*
D. ..... opthalmicæ. *Metopsilus celerio.*
E. ..... elongatæ. *Macroglossa stellatarum.*
F. ..... subpilosæ. *Sesia apiformis.*
G. ..... phalæniformes. *Zygæna filipendulæ.*

Bombyx is divided into twenty families:—

1. Larvæ with Sixteen Feet.

A. Larvæ sphingiformes. *Endromis versicolora.*
B. ..... verticillatæ. *Saturnia Pyri.*

* See Westwood's Intro. to Modern Class. of Insects, vol. ii. p. 326,

C. Larvæ tuberosæ. *Penthophora rubea.*
D. ..... nodosæ. *Leucoma salicis.*
E. ..... ursinæ. *Arctia caja.*
F. ..... celeripedes. *Spilosoma lubricipeda.*
G. ..... fasciculatæ. *Dasycheira pudibunda.*
H. ..... cristatæ. *Clostera curtula.*
I. ..... collariæ. *Gastropacha quercifolia.*
K. ..... villosæ. *Lasiocampa quercus.*
L. ..... pilosæ. *Eriogaster lanestris.*
M. ..... subpilosæ. *Pygæra bucephala.*
N. ..... lignivoræ. *Cossus ligniperda.*
O. ..... radicivoræ. *Hepialus humuli.*
P. ..... noctuiformes. *Petasia cassinea.*
Q. ..... geometriformes. *Pterostoma palpina.*
R. .. ... gibbosæ. *Noctodonta dromedarius.*

2. Larvæ with Fourteen Feet.

S. ..... furcatæ. *Cerura vinula.*
T. ..... cuspidatæ. *Platypteryx sicula.*

3. Larvæ without conspicuous Feet.

U. ..... limaciformes. *Limacodes testudo.*

The division of the Noctuæ is as follows:—

1. Larvæ with Fourteen Feet.

A. Larvæ tenticulatæ. *Europus Ulmi.*

2. Larvæ with Sixteen Feet.

B. ..... bombyciformes. *Acronycta tridens.*
C. ..... tineiformes. *Lithosia quadra.*
D. ..... rhomboidæ. *Hercyna paliolalis.*
E. ..... pubescentes. *Bryophila Algæ.*
F. ..... corticinæ. *Milesia bimaculata.*
H. ..... tenuistratæ. *Polia flavicincta.*
I. ..... variegatæ. *Cucullia Absinthii.*
K. ..... albosparsæ. *Xylina exoleta.*
L. ..... albopunctatæ. *Orthosia instabilis.*
M. ..... albilateres. *Orthosia* (*B. Steph.*) *pistacina.*

N. Larvæ terricolæ. *Agrotis suffusa.*
O. ..... largo-striatæ.
P. ..... obliquo-striatæ. *Phlogophera meticulosa.*
Q. ..... arcto-striatæ. *Leucania comma.*
R. ..... scutellatæ. *Cerastis vaccinii.*
S. ..... ochrocephalæ. *Xanthea citrago.*
T. ..... larvicidæ.
V. ..... furtivæ. *Apamæa latruncula.*
W. ..... curvilineatæ. *Heliothis Ononis.*
X. ..... ciliatæ. *Catocola Fraxini.*
Y. ..... pseudo-geometricæ. *Abrostola triplasia.*

3. Larvæ with Twelve Feet.

Z. ..... semigeometræ. *Plusia Festucæ.*
A. A. ... serpentinæ. *Ophiusa lunaris.*

In like manner the Geometræ are thus divided:—

1. Larvæ with Twelve Feet.

A. Larvæ seminoctuales. *Ellopia margaritaria.*
B. ..... stoloniformes. *Geometra cythisaria.*
C. ..... corticinæ. *Amphidasis hirtaria.*
D. ..... pedunculares. *Boarmia roboraria.*
E. ..... surculiformes.
F. ..... ramiformes. *Ennomos alniaria.*
G. ..... striatæ. *Hybernia defoliaria.*
H. ..... strigillatæ. *Cabera penaularia.*
I. ..... rigidæ. *Gnophos pullata.*
K. ..... noctuiformes. *Acidalia rhamnata.*
L. ..... rugosæ. *Larentia bipunctata.*
M. ..... squamosæ. *Cidaria fulvata.*
N. ..... signatæ. *Zerene adustata.*
O. ..... punctatæ. *Idæa dealbata.*
P. ..... filiformes. *Pellonia vibicaria.*

Dr. Horsfield had conceived a method of arrangement similar to the above, and began to act on it

before he was aware of the existence of the *Weiner Verzeichniss*. Adopting the views of Mr. Macleay, he endeavoured to work out on this basis a circular arrangement of the lepidopterous order, and accordingly divided it into the five following sections, namely, Papilionidæ, Sphingidæ, Bombycidæ, Noctuidæ, and Phalænidæ. The small portion of his work hitherto published is almost entirely confined to the diurnal Lepidoptera, and we have accordingly spoken of it in one of the volumes of this series devoted to that section; but he supposes that the other primary sections admit of a corresponding division into five types of form. Thus among the Sphingidæ, these are thought to be represented by Zygæna, Macroglossa, Smerinthus, Acherontia, and Sphinx. Among the Bombycidæ, the five predominating forms are:—1. Fasciculatæ, such as the genera Arctia and Laria; 2. Verticillatæ, exemplified by Saturnia; 3. Pilosæ, as in Lasiocampa; 4. Lignivoræ, typified by Hepialus, Cossus, &c.; 5. Cuspidatæ, represented by Notodonta. The Noctuidæ are divided in a similar manner, but we are so imperfectly acquainted with the larvæ of many of these, that the grouping is professedly provisional:—1. Nudæ, as in Agrotis, Polia, &c.; 2. Fusiformes, typified by Lithosia; 3. Fasiatæ; 4. Ciliatæ, exemplified by Catocala; 5. Semigeometræ, as in Plusia. A like number of dominating forms, to which all the others are supposed to be referrible, is thought to be exhibited by the Phalænidæ; viz.—1. Seminoctuales *(Phal. margaritaria)*; 2. Geometræ; 3. Pyralidæ; 4. Tortrices; 5. Tineæ.

"The arrangement of these tribes," says Mr. Westwood, to whose work we have been chiefly indebted for the above abstract;* is admitted to be but a provisional sketch, of which the outlines require to be filled up in future numbers of the work. It is consequently to be regretted that only two parts, comprising but a portion of the diurnal Lepidoptera, have hitherto been published. Dr. Horsfield endeavours to complete the lepidopterous circle by means of Hesperia, which in its structural characters and tortriciform larvæ (which roll up leaves, &c.), exhibits a decided departure from the typical Diurna, and a tendency towards some of the nocturnal Lepidoptera, as the Tortrices. Affinities also, of a more general nature, exist between the Papilionidæ and Phalænidæ. The situation of the genus Pterophorus, which, according to Reaumur and the *Weiner Verzeichniss*, is to be considered as intermediate between the diurnal and nocturnal Lepidoptera, he does not attempt to determine. With the exception, therefore, of the diurnal species, but little progress is here made in the classification of the order. A plan is indeed indicated for its natural arrangement; but it appears to me that the nocturnal groups will be found, when more satisfactorily investigated, by no means to correspond to these views."

Numerous and various as are the forms and aspects of the caterpillars of the lepidopterous tribes, Mr. Swainson thinks that they may nearly all be referred to five principal types. These he names:—

* Modern Classification of Insects, vol. ii. p. 328.

1. The *Iuliform* or pre-eminently typical, which are smooth and destitute of horns or other excrescences; for example, the caterpillars of cabbage butterflies. 2. *Raptorial*, or sub-typical. These are the *type of evil*, having the body covered with pungent spines, &c.; for example, the caterpillar of the peacock butterfly. 3. *Natatorial* or *Anopluriform;* caterpillars of the Hesperidæ, and Hawk-moths. 4. The *Suctorial* or *Vermiform*, called also the *Onisciform;* example, caterpillars of Polyommatus. 5. *Rasorial* or *Thysanuriform;* head and tail armed with spines; for example, the caterpillar of Pap. Cassiæ.

However much deserving of commendation certain parts of these classifications may be, they are far from being satisfactory on the whole. In a race of insects having the parts of the mouth, which afford such valuable characters in most other groups, so similar to each other, it can only be by a judicious combination of characters derived from all the different states, and not from one of them only, that a proper arrangement can be effected. The state of our knowledge is not at present such as to render an attempt of the kind advisable. A long and careful investigation of larvæ in their native haunts,—a more diligent search than has yet been made for the perfect insects, particularly of the smaller kinds, in foreign countries, must previously be undertaken. In scarcely any other department of exotic entomology has so little progress been made as in this. This has been partly owing to the

difficulties formerly alluded to, and partly to the vast extent of the subject. Let any one attempt to arrange and name a moderate sized collection of foreign moths, and he will soon be convinced how little has been done to facilitate his labours. The system of Latreille, one of the few that professes to apply to the whole subject, may now be regarded as little more than an outline, which leaves a great mass of the species altogether unprovided for. Hence the necessity that continually arises, even when giving the history of a comparatively limited number of species, for the establishment of many new genera. It must be admitted that such a step, in regard to insulated species, and when there is no means of distinctly pointing out the limits and relations of the genus so constituted, is in some degree unsatisfactory; and it becomes even more so when the genus is formed, as is sometimes necessarily the case, from the mere inspection of an engraved figure, destitute of those details of structure which should enter into the generic definition. But when it is found that the insect thus distinguished cannot with propriety be included in any of the existing genera; that it affords *prima facie* grounds of distinction which cannot be overlooked, there is no alternative but to adopt this course. It is at least advancing on the right path, although the progress may not be so considerable as might be desired.

There are few departments of entomology more worthy of the attention of travellers in foreign countries than that now under consideration. Scarcely

any will supply them with a greater number of new objects, or afford a wider field for interesting observation. The history of a large proportion of the moths of which we possess figures and descriptions in the perfect state, is entirely unknown to us. The appearance of the larva, its habits, food, metamorphoses, &c. have either never been noticed or not recorded. Of many, we are acquainted with only one sex; and in many cases, there is such a disparity between the male and female, that there is reason to believe that not a few, now regarded as distinct species, stand merely in that relation to each other. The subject, too, is far from being void of interest in an economical point of view. There is every reason to believe that there are indigenous moths in most countries capable of affording excellent silk; which, even although it might not supersede that afforded by the mulberry moth, might yet be converted to many useful purposes. Although much, as will be afterwards seen, has recently been done in India in manufacturing silk from a great variety of species, there is still strong inducement for further experiments and investigation, particularly in reference to those of large size, for if their produce could be made available, it might be so managed as to obtain it in almost any quantity.

EXOTIC MOTHS.

It is still a matter of dispute whether the Uraniidæ, the splendid tribe of Lepidoptera with which we terminated our account of Foreign Butterflies, really appertains to the true butterflies, or should be included among the crepuscular kinds. The structure of the antennæ, organs of the highest importance in the arrangement of this order, seem to indicate the latter as their true position; and this is further corroborated by the metamorphoses, with which we have but recently become acquainted. In ignorance of these, and influenced by the brilliant colours of the typical species, and their general appearance, Latreille arranged them with butterflies after Hesperia, and has been followed by most subsequent writers. In commencing the Heterocerous section, as has been done by the author just named, with Agarista, a very close connexion, therefore, subsisted between the two great divisions, so close, indeed, that it would be no easy matter to define

1 2 3 Caterpillar of A. Erythrinae.
4 ——— do of B. Molina
5 ——— do of B. Nesta
6 ——— do of B. Neltrix

1 *Agarista picta.*
2 *Euxemia lectrix.*
3 ——— *maculatrix.*

the line of demarcation. Mr. Westwood has not hesitated to include Agarista in the family of the Uraniidæ, and completely to disjoin the latter from the Rhopalocera (or Lepidoptera with club-shaped antennæ, including all the true butterflies) by the interposition of the Sphingidæ. It is impossible, however, to look at one of the brightly coloured day-flying Uraniidæ, without at once recognising a much closer affinity to the true butterflies than is presented by any of the sphingideous species; and whatever distribution may be ultimately adopted, it seems indispensable that the Uraniidæ should immediately succeed the Rhopalocera.

AGARISTA PICTA.

PLATE II. Fig. 1.

Leach, Zool. Miscellany, vol. i. pl. 15; *God. Ency. Meth.* vol. ix. p. 803; *Boisduv. Voy. de l'Astrolobe*, p. 172.—Pap. Agricola, *Donovan's Insects of New Holland.*

According to his arrangement, Latreille justly regarded the genus Agarista as one of the most characteristic of the group which he named *Hesperi-sphinges*, as intermediate between the Hespereidan butterflies and the sphinxes properly so called. The antennæ of the hesperi-sphinges are simple, thick-

ened towards the extremity, at which they again become slender and have the point recurved; but the latter is never furnished with a pencil of hairs. The spiral tongue is long and conspicuous; the palpi are also developed, and consist of three joints. In Agarista these joints are elongated, the second very much compressed, the terminal one slender and nearly naked. The fore tibiæ are provided with spurs.

The Agaristæ fly by day, and are similar in their habits to the hawk-moths; they do not, however, possess the same power of sustained and vigorous flight as the latter. Their metropolis is New Holland, although individual species occur elsewhere; *A. octomaculata*, for example, is a native of South America. * Lewin has made us acquainted with the metamorphoses of one of the species, viz. *A. Glycinæ*, which he figures and describes in his Lepidoptera of New South Wales (pl. 1), under the name of *Phalænoides Glycinæ*. The caterpillar has no resemblance to that of a hawk-moth, but is cylindrical and hairy, the anal segment with an indistinct tubercular elevation on the back. It does not confine itself for food to any one family of plants. Before changing to a pupa, it spun a slight web on the under side of a branch, in the month of January, in which the chrysalis remained for seventy-five days, the winged insect emerging in April.

* We are acquainted with this species only from a description in the *Ency. Meth.* It may possibly turn out not to be a true Agarista.

A. picta is an elegant insect, measuring about two inches and a half between the tips of the wings. The fore wings are black, with a short longitudinal bar of pale green scales at the base, continuous with a bar of the same colour at the hinder part of the thorax; behind this is a curved and rather indistinct fascia of bluish scales, which is succeeded by a large oval orange-coloured spot, at some distance from which is an irregular row of six oval spots of the same colour; behind this a slight fascia of bluish scales, which is indistinctly continued in a serpentine form beneath both the orange bars so as to appear continuous with the middle bar of the hind wings; still nearer the apex of the wings are several patches of greenish scales, and the extreme tip is white. The hind wings are black, with a central cross bar of greenish-blue scales; and there is a dark pink fascia extending from the anal angle half-way across the wing. The thorax is black, spotted in front with pale green, and having a pale green transverse fascia at the base, and a broader one at the apex of the tippets. The abdomen is black, with a terminal tuft of orange-coloured hairs. The palpi, as well as the hairs round the eyes, are white: the breast and thighs clothed with long red hairs. The four anterior tibiæ have an orange line externally, and the tips of the tarsal joints are annulated with white. The anal apparatus of the specimen here figured is remarkable; consisting of two very large valves arising from the extremity of the body and recurved; between these

lies a slender horny piece thickened at the tips, in front of which is an erect bifid horny process, the upper division of which forms a slender and very acute hook.

The species is a native of New Holland. The specimen here figured from a drawing made for us by Mr. Westwood, is in the collection of the Rev. F. W. Hope.

EUSEMIA LECTRIX.

PLATE ii. Fig. 2.

Bombyx lectrix, *Linn.*; *Cramer, Pap. Exot.* pl. 192, fig. C.; *Donovan's Ins. of China*, pl. 43, fig. 2.

This sub-genus was proposed by Dalman in his monograph on Castnia for the beautiful insect here figured. He considered it as very nearly allied to Agarista, and such is certainly the case, since they agree in the structure of the antennæ, palpi, spiral tongue, veins, bridle, and general colouring of the wings. The principal difference is in the structure of the fore legs, which are sufficiently unlike to warrant the separation. The anterior thighs (as they appear in *E. maculatrix*) have not the strong brush of hairs, which is so conspicuous in Agarista,

and in fact are glabrous. The tarsi are very long, and become gradually more slender to the tips, which are furnished each with one very long and slender unguis, the other being short and bifid. The four terminal joints of the tarsi are almost denuded, except that there exists a row of very delicate short setæ, and another of slender, short, incurved spinulæ.

E. lectrix measures about three inches between the tips of the wings; the ground colour of the upper pair is deep black, with numerous bluish-white and yellow spots, one of the latter forming a broad abbreviated band near the middle, and the former a curved series not far from the tip; under wings likewise deep black, the base red, and an irregular macular band of the same colour towards the middle, succeeded by a series of remote bluish-white oval spots, nearly on a line with those of the superior wings. The thorax is black, with an oblong yellow spot on each side; abdomen black, annulated with red. The under side corresponds in its markings to the upper.

It has been hitherto found only in China, but it is not unlikely that it likewise occurs in Eastern India.

EUSEMIA MACULATRIX.

PLATE II. Fig. 3.

EXPANSION of the wings nearly three and a half inches: colour of the anterior pair intense black, with some slight patches of blue scales at the base; this is succeeded by a small white triangular patch, then two large suboval ones, then three placed wider apart, and between these and the apex are five small oval spots. Hind wings bright orange, black at the base, with a black costal spot and a large black discoidal one extending to the anal angle, and posteriorly emitting two narrow longitudinal bars which are connected with the very broad and irregular black margin; in the latter are two white spots, that nearest the fore wings being largest. The head and thorax are black, the shoulders pale yellow; abdomen orange, with black transverse stripes. In the specimen here figured, the abdomen is terminated by two broad triangular horny lobes, externally covered with orange-coloured hairs. The sides of the thorax beneath are black, with an orange-coloured stripe down the breast; the belly is also orange with black spots. The legs are long and black.

1 Eterusia tricolor 2 Erasmia pulchella 3 Amesia sanguiflua

The specimen we have here the pleasure of figuring is unique. It was recently brought from the Assam territories, and is one of the numerous rarities in the Rev. F. W. Hope's collection.

ETERUSIA TRICOLOR.

PLATE III. Fig. 1.

Hope, Linnæan Trans., vol. xviii. pl. 31, fig. 4.

This and the two following insects we place together, because they present several points in common, although there remains, notwithstanding, considerable diversity among them. For accurate descriptions of the two first, we are indebted to Mr. Hope, in the work above cited, who refers them, with doubt, to the family Zygenidæ. Nothing, indeed, can be more uncertain, in the present state of our knowledge, than their true relations; and these we are not likely to be in a condition to determine, till we become acquainted with the metamorphoses and general history of the group. As far as we are acquainted with their geographical distribution, they seem confined to Eastern India, most of them being from Assam. Eterusia * is characterised as a genus

* Ἑτερουσιος, qui alterius seu diversi essentiæ.

by having the wings narrow and entire, the anterior apical nerve trifurcate, the middle nerve also trifurcate, the branches nearly straight; under wings rather short, entire, the cell elongated, and the apex emitting nerves which are nearly straight; antennæ of the female slender, very slightly serrated on one side; tongue spiral, elongated; palpi short; abdomen provided with a small exserted terebra. The species figured expands two inches eight lines. Head dark violet, antennæ black; anterior wings greenish, marked with several white spots; the hinder pair orange at the base, the exterior half black, passing into violet towards the apex, and spotted with white. The thorax is velvet black, tinged before and behind with violet. Abdomen orange, the first or basal segment violet. Under side of the body violet-blue, the segments of the abdomen alternately variegated with white and black.

This insect is a native of Assam. "It appears," says Mr. Hope, in whose extensive collection specimens are preserved, "to be a nondescript, and is one of the most beautiful in colouring of my acquaintance; it is probably one of the genera of a family peculiar to the East Indies. Little is known of the oriental Lepidoptera, except those described in the *Annulosa Javanica* of Dr. Horsfield, so much so that I hesitate in hazarding an opinion respecting them. It is almost impossible to describe the beautiful colouring of this lovely insect; the dye of the under wings is of a rich mazarine blue, which passes insensibly into violet and black. In affinity

the genus is allied to *Campylotes* of Westwood, described in Professor Royle's work on the Natural History of the Himalaya mountains. * It is allied also to *Gymnautocera* of Guerin, and to *Heleona* and *Anthomyza* of the same author. It is doubtful if the insects composing this family are more allied to the *Zygenidæ* than the *Lithosiadæ*: they appear to have been greatly neglected, and it is the more remarkable, as they are certainly some of the most beautiful of the Lepidoptera."

ERASMIA PULCHELLA.

PLATE III. Fig. 2.

Hope, Linnean Trans., vol. xviii. pl. 31, fig. 5.

THE antennæ of this genus (the name of which is derived from ερασμιος, *amabilis*) are bipectinated, the pectinations of moderate length; anterior wings

* For the purpose of comparison, Mr. Westwood's definition of the genus Campylotes is subjoined.—"Genus anomalum: Alæ oblongæ, subovales, integræ, nervis apicalibus valde recurvis, anticæ cellula discoidali clausa nervos duos postice emittens, quorum exterior 3-furcatis; posticæ etiam cellula discoidali clausa, nervo recurrente intermedio bifurcato. Antennæ graciles biramosæ."

oblong, suboval, entire, the hinder nerve a little curved, the discoidal cell closed; posterior wings subrotund, the hinder nerves curved; body slender, subcylindric; head and palpi small; tongue long and spiral; legs slender.

The only species hitherto described measures about three inches two lines between the tips of the wings: prevailing colour silvery green; anterior wings black, ornamented with green-blue silvery spots, an irregular red bar before the middle, and large white spots behind the middle; posterior wings straw-coloured, black at the base and apex, the nervures green-blue.

"The above insect," says Mr. Hope, "is one of the most lovely in colouring of all the Lepidoptera. When viewed by individuals standing in different lights, the blue appears to one person to be a vivid green, to another of a lazulite blue. I have had drawings made by different persons; the first contends that the colour is green, the second that it is blue; in short, both are right; all depends on the situation in which the individual views the specimens."

This insect is likewise from Assam.

AMESIA SANGUIFLUA.

PLATE III. Fig. 3.

Phalæna sanguiflua, *Drury*, *Exot. Ent.*, vol. ii. pl. 20, figs. 1, 2.

We have been induced to re-figure this very singular moth from a specimen in the collection of the Rev. F. W. Hope, not only because Drury's figures are very inaccurate, especially in the form of the wings and arrangement of the nervures, but because they are incomplete, wanting the head and antennæ, so that it is impossible to obtain an idea of the relations of the insect. This is still, however, a matter of difficult determination, although a certain relationship between it and the two species last described cannot be questioned. But the present species differs from these in its considerably larger size, the singular arched form of the fore wings, and the arrangement of the wing-veins, which, it will be seen, are curiously curved at the apical part of the fore wings, instead of running straight to the tips. In this respect the insect is more nearly related to Campylotes, but it differs from this, and all the allied genera, except Eterusia, in not possessing the single simple vein which runs from the extremity of

the cell formed between the postcostal and great medial veins to the tip of the wings.

The antennæ are rather long, slender, and bipectinated to the tip, the pectinations being of nearly equal length throughout, those at the extremity very slightly longer, so that the antennæ appear at first sight rather clavate.

Expansion of the wings four inches and a quarter. Head and thorax bluish-black; antennæ of the same colour. Anterior wings black, with a considerable number of small spots scattered over the surface, five of which, placed towards the base, are yellow, the rest white; the nervures from the middle to the apex are each accompanied by a dark red stripe; posterior wings black from the base to beyond the middle, with a few white spots encircled with blue, the exterior part brilliant mazarine blue, with a considerable number of white spots: abdomen deep blue, all the segments having a small white spot on each side. On the under side the spots are smaller and more numerous, most of them encircled with blue, the marginal row double; the nervures without the red stripe.

Mr. Hope's specimen is from Assam; and we have seen another very fine one in the possession of James Wilson, Esq., which was received from the neighbourhood of Serampore. Drury gives Surinam as the locality of his insect; but the probability that there is some mistake in this, is much greater than the likelihood that it would occur so remotely from what is evidently its native region.

1 Heteona fenestrata
2 Anthemis Tenuis

HELEONA FENESTRATA.

PLATE IV. Fig. 1.

Guerin.—Swainson's Zool. Illust., pl. 116.

THIS and the following genus belong to the family of the Anthroceridæ, of which many small and finely coloured species are known as occurring both in this country and on the continent. Several of these we have already characterised, and shall proceed to describe the only exotic examples which we can here afford space to introduce.

Heleona is characterised by Mr. Swainson as having the anterior wings papilioniform, that is, with the exterior margin as long as the posterior, or even longer; the hind wing lengthened perpendicularly, but short and rounded; the antennæ pectinate in both sexes. The typical species is the *Phal. militaris* (Cramer, i. pl. 29 B.; Roesel, Ins. Belust., vol. iv. p. 6. fig. 3; Donovan, Ins. of China, pl. 43), an elegant insect found in several parts of Eastern Asia. It expands nearly four inches; the upper wings with the inner half yellow, spotted with violet-blue, the apical half blue spotted with white; the hind wings yellow, with

several broad macular violet-blue bands; thorax and abdomen yellow, the former with blue transverse bars. Another example is *H. Numanæ (Bombyx Numana*, Cramer, pl. 227 A. male, and 228, A. female), the upper wings of which are of a deep blue with yellow spots; the under pair with the whole of the disk yellow, abdomen likewise of that colour, with black bands. It is a native of the Molucca Islands.

The species figured has the upper wings hyaline, clouded with irregular spots and waved bands of violet-blue; hinder wings with a few transverse violet-blue marks and a broad marginal band of the same colour, in the centre of which there is an irregular band of orange spots, some of which are angular, others round, and that on the anal angle inclining to semicircular. Head, thorax, and abdomen orange; antennæ black.

It is a native of Australia, and is said to be very rare in that country. We are informed by Mr. Swainson that it was twice seen by Mr. Cunningham, on the north-west coast of Australia; once in shady woods descending to the shores of York Island, and again in nutmeg-woods adjoining Brunswick Bay.

ANTHOMYZA TIRESIA.

PLATE IV. Fig. 2.

Pap. Tiresia, *Cramer, Pap. Exot.*, pl. 85, f. B.—Anthomyza Tiresia, *Swainson's Zool. Illus.*, pl. 124.

This subgeneric group may be distinguished from the other Anthroceridæ, or moth-like day-flying Sphingidæ, by having the antennæ slightly pectinated in one sex only; palpi pointing vertically; anterior wings with the outer or exterior margin much shorter than the posterior; hind wings lengthened horizontally, but short and rounded. This definition, according to Mr. Swainson, includes all the large and imposing species of this tribe found in Tropical America; and by comparing their characters with those of the oriental group last described, it will be seen how strikingly they differ. The author just named states that he paid great attention to these insects, during his researches in Brazil, which is the chief metropolis of the group. They fly slowly and heavily during the middle of the day, and on the least touch counterfeit death. Most of the species, when handled, discharge from their body a brown liquor, like their prototypes the Heli-

conidæ. They certainly bear a very striking general resemblance to the Heleconian butterflies, and the analogy must be admitted to be close.

A. Tiresia measures three inches and three-quarters between the extremities of the wings: the upper pair are deep black with two broad, opaque, deep yellow bands lying obliquely across the surface, one near the middle, the other, somewhat abbreviated, towards the apex, and a patch of the same colour on the hinder border before the middle; the base with a few small white spots, and a remote series of the same near the exterior margin and parallel with it. The hinder wings are yellow, with a broad black border bearing a marginal row of white spots: anterior part of the thorax spotted with white; abdomen brown.

A. heleconides. Colours and the mode of their distribution precisely as in the preceding species, but the yellow paler, approaching to yellowish-white, and the bars and spots transparent. Expansion of the wings three inches. *Swainson's Zool. Illus.*, pl. 124, fig. 2.

1 *Metopsilus Tersa*
2 *Sphinx Chionanthi*

METOPSILUS TERSA.

PLATE V. Fig. 1.

Sphinx tersa, *Linn. Mant.*, p. 538; *Cramer, Pap. Exot.*, t. 397, fig. C.; *Abbot and Smith, Lepid. Geor.*, i. pl. 38.—Deilephila tersa, *Drury*, vol. i. pl. 28, fig. 3.

THIS prettily marked insect affords a very characteristic example of that section of sphinges which presents a distinctive modification in the form of the anterior wings, a peculiarity associated with another in the appearance of the caterpillars, which are rather suddenly attenuated in front, and have the power of drawing these narrowed segments within each other. This group, to which we have given the subgeneric name of Metopsilus, * has the antennæ but slightly clavate, the anterior wings very acute at the apex, with a sinuosity or emargination on the hinder edge just below the tip, which gives them a somewhat falcate shape; the inner margin likewise sinuated behind the middle. The caterpillars are ornamented with eye-like spots on some of the anterior segments; the anal horn in most cases distinct, but occasionally obsolete. We have several elephant hawkmoths, as the members of

* See Nat. Lib. Ent., vol. iv. p. 154.

this group are termed in Britain, and like the majority of the larger Sphingidæ, they are extensively distributed, occurring in almost every quarter of the globe. *M. tersa* is a native both of North and South America, as well as of the West Indian Islands. It measures about three inches across the wings; the general colour greyish olive-brown; the anterior wings entirely of that hue, with a few delicate parallel lines of a lighter colour, running from the base somewhat obliquely to the tip; posterior wings black at the base, brown along the external margin, with a row of cream-coloured triangular spots between these two colours; fringe of the wings white. The head is flesh-coloured, and there is a stripe of the same running along each side of the thorax; the back of the latter clay colour, the sides yellowish-brown.

The caterpillar (Plate VI. fig. 1) is of a delicate green with numerous small longitudinal spots of reddish brown; prolegs yellow; on each segment, except the second and third, there is a yellow oval spot, marked with black above and below, placed on a lighter ground; and higher up a longitudinal white stripe, commencing at the fifth segment and running to the tail, and having a series of ocellated spots placed on it; there is likewise a large ocellated spot, of a more complex description, on the fourth segment, in line with the others; tail red. The pupa is yellowish-brown. The caterpillar feeds on what Abbot calls wild thyme, but which is a species of spermacoce (*S. hyssopifolia*). The author

1. Caterpillar of Metoposilus Tersa.
2. Do of Sphinx Chionanthi.
3. Do of Sphinx tiaivie.

just named found the caterpillars spin themselves up on the 21st July, and come out in the perfect state on the 15th August; others of them spun on the 11th September, and the fly came out on the 9th May. This hawkmoth is not very common in Georgia, but may sometimes be observed sucking the gourd blossoms in autumn.

SPHINX CHIONANTHI.

PLATE V.* Fig. 2.

Abbot and Smith, Lepid. Geor., i. pl. 34.—Sphinx rustica, *Fabr. Cramer, Pap. Exot.*, t. 301, f. A.

This conspicuous and curiously marked insect is another fine example of the sphinges of the New World. The ground colour is a rich brown, the surface variously marked and mottled with white. The base of the fore wings is of the latter colour; there is then a transverse bar of the same before the middle, from which the inner margin of the wing is broadly white, that colour blending at the posterior extremity with another broad waved stripe from the anterior border a little beyond the middle; the brown semicircular space in the middle of the wing

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bounded by these white portions, bears a small round white spot in the centre, and there is a waved white streak at the apex of the wing; the whole of the white parts are waved and clouded with light brown. The hinder wings are almost wholly brown, excepting the base and a few marks near the anal angle which are white; fringe of all the wings brown and white alternately. The head and thorax are variously marked with white, the latter with two small round white spots anteriorly, and a large posterior patch bearing a very faint resemblance to a death's-head; three anterior segments of the abdomen with a large yellow round spot on each side.

The caterpillar (Plate VI. fig. 2) is yellowish green, the latter hue prevailing on the under side, and the former on the back and sides. There is a series of oblique stripes along the sides of the segments, consisting of a streak of white, purple, and faint blue. These are wanting in the three segments behind the head, which have two dorsal rows of reddish tubercles; tail yellow, granular. "It feeds," says Abbot, "on the fringe-tree (*Chionanthus Virginica*), called old-man's-beard from its clusters of white blossoms, and also on the privet and lilac. I procured several in Virginia upon the last mentioned shrub, which went into the ground July 31st, but every one of them died in the chrysalis during winter. After I had been several years in Georgia, I found some on the old-man's-beard in June, which buried themselves on the 22nd of that month, and

came forth on the wing July 20th. It is not a common moth.

" Of those insects which go into the earth, and breed twice in the year, it is best to procure the spring caterpillars, which are much more likely to survive, the autumnal ones commonly dying in chrysalis in the winter."

On the same plate with the preceding caterpillars, we have figured a very beautifully marked larva (fig. 3) of an American species of Humming-bird Hawk-moth, described by Abbot and Smith under the name of *Sphinx Gauræ*. It is nearly related to the *S. Medea* and *S. Œnotheræ* of Fabricius. The moth has the wings dentated; the anterior pair olive-green, with two whitish transverse streaks, and a discoidal small rounded spot of the same colour; the hinder pair ferruginous, with a pale streak exteriorly. The caterpillar feeds on the gaura (*Gaura biennis*) in the month of May. The moth is rare in Georgia and most other parts of America, and in its habits seems closely to resemble our own Humming-bird Hawk-moth.

PHILAMPELUS VITIS.

PLATE V.

Sphinx vitis, *Linn. Syst. Nat.*; *Merian, Surin. Ins.*, t. 47, f. 1; *Cram. Pap. Exot.*, t. 267, fig. C.; *Abbot and Smith, Lepid. Geor.*, i. pl. 40; *Drury, Ins.*, i. pl. 28, fig. 1.

On first examining this beautiful sphinx, we are at some loss to determine to which of the modern genera of the family it should be referred. It has obviously some relationship to Daphnis, and the attenuated anterior segments of the caterpillar might lead us at first sight to suppose it to be a species of Metopsilus. We soon perceive, however, that these segments are not so suddenly narrowed, and therefore not so perfectly retractile as in a genuine *Chenille cochonne*, while the absence of the lateral ocellated marks is a still further proof of deviation from that genus. After fully considering its peculiarities, Dr. Harris, in his valuable Memoir on the American Sphingidæ, found it necessary to make it the type of a new genus, which he names Philampelus. He says, of this and the other insects belonging to the genus so designated, "They cannot with propriety be included in the genus Chærocampa of Duponchel or Metopsilus of Duncan, to which they approach the nearest. They, indeed, seem to form a characteristic and typical group peculiar to the New World." Besides the species here figured, *S. sabellitia* and *S. achemon* belong to this group.

The expansion of the wings, in *Philampelus vitis*, is about four inches; head, antennæ, and thorax dark flesh-coloured, the latter with a broad central stripe of olive-brown and a shorter one on each side, the central one sometimes prolonged over the vertex of the head. Anterior wings olive-brown, with various flesh-coloured bars and stripes; two conspicuous broad bars of the last mentioned colour diverge from the base of the wing, one of them running along the centre, the other along the anterior border, and unite with a transverse one, which commences at the apex and terminates towards the middle of the posterior margin; external margin with a broad clay-coloured band. The base of the under wings is bluish-ash, which colour is succeeded by a broad black band, and the hinder extremity is red; the anal angle black. The ground colour of the abdomen is the same as that of the thorax, the back with two parallel streaks of olive-brown, which are intersected by a narrow band of the same colour on each segment.

The caterpillar is greenish-yellow, transversely striped with reddish-brown, with a series of oblique white stripes on the sides, terminating a little below the spirales, which are included within the white portion; head and legs reddish-brown; the anal segment acutely prominent on the back, but not prolonged into a horn. Its food seems to be various. Abbot figures it on the *Jussiea erecta*, but it more commonly feeds on the vine and *magnolia glauca*. It is not a very common insect in America.

HEPIALIDÆ.

THE HEPIALIDÆ have a peculiar aspect, combined with minute peculiarities of structure, which renders the family one of the most distinct of all the Heterocerous Lepidoptera. They form the first group of Latreille's section Nocturna, which differs from that named Crepuscularia by having the antennæ setaceous, or tapering gradually to the tip. "They have the antennæ very short and filiform, never feathered to the tip; the spiral tongue is either obsolete or very short; the palpi are also generally obsolete; the abdomen is elongated, as are also the wings, which are deflexed in repose, the extremity of the former being attenuated into an ovipositor of considerable length, so as to be capable of being withdrawn, or introduced into the crevices of the bark of trees, &c.: the thorax is never crested; the nerves of the wing are far more complicated than in any of the preceding groups. The caterpillars are fleshy naked grubs, with a few straggling hairs; they are 16-footed (having 6 pectoral, 8 ventral, and 2 anal feet). They feed upon the wood of standing trees, or the roots of vegetables. When full grown, they construct a cocoon of the morsels of wood or vegetables upon which they have been feeding." *

* Introduction to the Modern Classification of Insects, by J. O. Westwood, vol. ii. p. 376.

1.2 Hepialus lignivora.
3 Caterpillar of Dº
4 Zeuzera minea.

HEPIALUS LIGNIVORUS.

PLATE VIII. Figs. 1, 2, 3.

Hepialus lignivoren, *Lewin's Nat. Hist. Lepid. of New South Wales*, pl. 16.

EXAMPLES have been already given of British Hepiali, * with some account of their general habits. The foreign species are pretty numerous, and some of them remarkable for their size. This is the case in particular with *H. crassus* (Drury's Exot. Ins., vol. iii. pl. 2, fig. 1), a native of Sierra Leone, which measures upwards of half a foot between the tips of the wings. They are in general of very plain colours, but the species figured on the plate above referred to is a striking exception in this respect. It is in fact a highly ornamental insect, the fore wings being of a brilliant yellowish-green, divided into two patches by a waved band of a faint ferruginous colour, intersected by dusky, and several acute points of scarlet; there are some short marks of the same colour on the anterior edge. The posterior wings are reddish flesh-colour, tinged with blue at the base, the abdominal margin with a black stripe.

* Nat. Lib. Ent., vol. iv. p. 179.

Not only does this moth fully answer to the observation of Lewin, that it is the most beautiful species we have seen of that tribe of moths sometimes known in England by the name of Swifts, but its transformations are equally unlike those of the rest of the genus, having more resemblance to those of *Cossus* or *Zeuzera*. The larva forms a lodgement or chamber in the centre of a stem of a species of *Casaurina* or the she-oak of the colony, and feeding on the bark and sappy wood directly above the entrance, eating round the stem, and carefully hiding its dilapidations by weaving fragments of wood and bark which it gnaws off, in a strong web; forming at once a fortification and disguise of considerable bulk and thickness around the stem, under which, in a winding cylindric passage, the larva constantly keeps its body while at work, alternately gnawing and weaving; but retires to the chamber in the stem to repose. Across the mouth of this chamber it spins a close web, and changes to a pupa in January, soon after which the concealing fabric, to form which the larva took so much pains, falls away. It remains in the pupa state about twenty-five days, when, by a strong vertical motion of its joints and serrated rings, the pupa forces the web, and the moth is produced generally in February. The moth is shown at rest in the upper part of the plate, and the larva in a section of its chamber, and its disguise, as mentioned above, in other parts of the plate.

ZEUZERA MINEA.

PLATE VIII. Fig. 4.

Phalæna mineus, *Cramer, Pap. Exot.*, vol. ii. pl. 131, fig. D.; *Donovan's Insects of India*, pl. 53, fig. 1 and 1 a.—Zeuzera viridicans, *Eschscholtz in Kotzebues, Reise in die Zud-see*, &c. pl. 11, fig. 29.

The first figure published of this splendid Zeuzera was that of Cramer, which indifferently represents the male, which he states to have been received from Batavia. Donovan subsequently gave highly coloured figures of both male and female, brought by Mr. Fichtel from Bengal, and Eschscholtz appears to have delineated a very indifferent specimen in his voyage to the South Sea. The figure in the adjoining plate is from a drawing by Mr. Westwood from a specimen in Mr. Hope's collection, and was received by that gentleman from Bengal.

The body is of a fine cyaneous blue, the wings pale orange, marked with cyaneous; the anterior having eight small patches on the costal margin, a transverse bar near the base, a broad longitudinal bar, several circular and oblong marks between the costal and central marks, two spots on the posterior margin and eight upon the apical margin. The

hind wings are almost entirely covered by the very broad central cyaneous mark, and there are also several spots on the hinder margin. The expanse of the wings varies from three to four inches.

OIKETICUS* KIRBYI.

PLATE IX.

Lansdown Guilding, in *Linn. Trans.*, vol. xv. p. 371.

This insect, as well as that next described, was first made known to entomologists by the Rev. Lansdown Guilding, in a paper read to the Linnean Society of London on the 6th June 1826, and published in the fifteenth volume of their Transactions. Its economy is so remarkable that it has ever since excited attention, and its history can scarcely fail to be read with interest. The most curious circumstance is that the female is entirely apterous, that she never leaves the puparium, but there receives the male and produces her eggs, after which she soon dies.

Various moths exist, both in this and other countries, the females of which are apterous; such as

* Named from οἰκητικὸς *qui habitaculum quærere solet.*

1.2.3.4.5 Metamorphoses of Orketicus Kirbyi
6. Cryptotheca Macleayi

those of the genus Psyche, Fumea, &c. " The male larva of Psyche," says Mr. Westwood,* " previously to assuming the pupa state, fastens its case by the mouth to the surface of leaves and the stems of plants; the larva then turns, so that its head is pointed towards the opposite aperture, out of which the pupa half pushes itself before becoming an imago; the females, on the other hand, never leave their cases; and from some observations made by Ochsenheimer and Ingpen, it would appear that these females produce fertile eggs without impregnation." There is therefore, a striking analogy between these insects and Oiketicus, although many points remain in which they materially differ.

Mr. Guilding states that he became acquainted with these animals on returning to the West Indies in 1817; but although he had attentively studied them, he was unable to complete their history for many years afterwards. The larvæ being common on many different kinds of trees, were bred in considerable numbers, but he was long disappointed in discovering the female insect. The male, at the stated period, made its appearance; but he never dreamed that its unwieldy and almost motionless partner was to be searched for in the puparium, which it was destined never to desert. Judging from other insects, he imagined that the female pupa had not been fully developed in consequence of the attacks of parasitic ichneumonidæ. It was

† Introduction to the Modern Classification of Insects, vol. ii. p. 389.

only by accident that a specimen, uncased after the rupture of the thoracic carina, cleared up the mystery. When the pupa had slept the appointed time, the animal, still resident within the habitaculum formed by the larva, was found to open the carina by the motion of its head, and prepare to receive the winged male. Here, therefore, we have an animal which in its adult state is for ever excluded from the light, and never even beholds the mate to which it is indebted for its progeny. After impregnation, the female begins to fill the bottom of its puparium with her ova, closely packed in the down rubbed from her body, and having performed this duty, either presses herself through the thoracic carina, reduced to a shrivelled morsel of dried and scarcely animated skin, or dies within the case.*

The eggs are rounded, small, and yellow, and exist in very great numbers. As soon as hatched, the larvæ force their way out of the puparium, spread themselves over the tree, and commence to prepare a habitation even before they have taken food. This habitaculum is cylindrical, open at both ends, and strengthened by small pieces of wood, gnawed leaves, &c. held together by interwoven threads. Under its protection the larva moves about much in the same manner as takes place with the Phryganidæ. When young the tail is borne erect, but it soon becomes horozontal owing to the weight of the incumbent mass. The larva is thick and fleshy with broad black feet, the three pectoral pairs very

* Linn. Trans., vol. xv. p. 372.

strong; the abdominal feet are ten in number, two of them anal. The body consists of twelve segments, the sides somewhat prominent, the whole with thinly scattered hairs. The three anterior segments and the head are yellowish variegated with brown marks, the rest of a dull livid colour. When the larva is alarmed, it very rapidly shuts up the purse-like aperture of its dwelling by means of its mandibles and fore legs, and thus remains in security suspended only by a few threads. (Plate IX. fig. 1 represents a female larva in its case, in the act of creeping. Fig. 2, the same larva withdrawn from its case.) Having attained its full growth, and about to undergo metamorphosis, it fixes one end of its habitaculum firmly to a branch by means of silk threads spun for the purpose, and allowing itself to hang perpendicularly, awaits in this position the pupal sleep. (Plate IX. fig. 3 represents the habitaculum of an adult male thus suspended.) The pupa of the male is elongated, brown, the abdominal segments with a rust-coloured ring, the front somewhat carinated, and each segment furnished with a double series of dorsal spinulæ; that of the female is of the same colour, but much thicker.

When the male appears in the winged state, he is found to be of a uniform black colour glossed with purple; the upper wings rather narrow and elongated, the under pair small and slightly produced at the anal angle. The abdomen is extensile and elongated; tarsi rufescent; mouth pale; antennæ strongly pectinated from the base to the middle,

the apex serrulated. Extension of the wings about an inch and three-quarters; length of the body one inch two lines. (Plate IX. fig. 4.)

The female has more the appearance of a pupa than a mature insect, the three great divisions of the body being scarcely defined, and the whole enclosed in a tough envelope. Here exist neither spiral tongue (this, indeed, seems to be wanting in the male also), palpi, nor antennæ; the feet are spurious, very short, and destitute of claws. The eyes are rufescent; the general colour of the body brownish; the neck and anus clothed with wool-like hairs. (Plate IX. fig. 5.)

It may well appear surprising, under such circumstances, how the sexes can communicate with each other for the continuance of the species, the female being continually enclosed in the pupa case, which might be supposed to present an insuperable obstacle to the approaches of the male. The mode in which this is accomplished has already been hinted at; the ridge on the upper side of the thorax splits asunder, and such is the length and flexibility of the abdomen, and the peculiar construction of the organs of generation, that this suffices for the purpose. *

The insect appears to be plentiful in many parts of the West Indies, and is extremely injurious to fruit-trees in gardens. It is difficult to determine the proper relations of this moth; in its habits and

* Glans penis longitudine corporis, extensilis, non retractilis? spinulis recurvis sparsus. *Guilding*

metamorphosis it obviously approaches to Psyche, but the appearance of the perfect insect is very dissimilar. Guilding conjectured that it might be allied to Zeuzera; Mr. Westwood considers it as forming the connecting link between the Hepialidæ and the remainder of the Bombycidæ, and certainly, if we put out of view the metamorphosis, there can be no doubt about its affinity to the former.

CRYPTOTHELEA* MACLEAYI.

PLATE IX. Fig. 6.

Lansdown Guilding, in *Linn. Trans.*, vol. xv. p. 371.

Mr. Guilding has described this species in the same paper as the last, and under the same generic name. But the slightest examination of his beautiful figures at once shews that the characters he assumes as specific possess a generic value. Nay, in an artificial arrangement, the two genera must be widely removed from each other; for while Oiketicus, in the perfect form, shows an obvious affinity to the Hepialidæ, the moth in question makes a near approach to Psyche. Although we notice it,

* Κρυπτος *concealed*, and θηλεια, *female*.

therefore, in connexion with the former species, it must be understood that they resemble each other only in their metamorphoses, which are indeed strikingly similar.

Cryptothelea has the antennæ pectinated throughout their whole extent, the pectinations gradually diminishing in length from the base to the apex; wings broad and ample, the exterior margin of all of them rounded; body slender, and the extremity of the abdomen not projecting beyond the line of the hinder wings. Female apterous, never leaving the puparium.

The male of this species, named by its discoverer in honour of Mr. Macleay, is wholly of a black colour; the female yellowish, each segment with a band of yellow wool-like hairs. The larva has the three anterior segments of the thorax and the head yellow with brown marks; the rest obscure and bearing scattered pale warts. It always carries its tail erect, and lives among the branches and trunks of old trees, frequently forming its moveable tent of the lichens with which they are covered. In most other respects the history of this insect nearly corresponds to that of *O. Kirbyi*.

Metamorphoses of Cryptophasa irrorata.

CRYPTOPHASA IRRORATA.

PLATE X. Figs. 1, 2.

Lewin, Lepid. of New South Wales, pl. 10.

THE genus Cryptophasa (or, as it was termed, section of the genus Bombyx) was established in 1822 by Mr. Lewin,* for the reception of several very interesting moths, inhabitants of New South

* Lewin had discovered these curious moths so early as 1803, although entomologists in general had no means of becoming acquainted with them till the appearance of his work many years after. We find the following reference to them in a manuscript letter addressed to Mr. Dru Drury of London, the celebrated collector of insects, from New South Wales, 7th March, 1803. "I was at a loss to know where to look for the larvæ of moths for a great while after I came here, for I never could find any in all my different travels into the country; but now my surprise is at an end; and I daresay you will be greatly pleased to hear that I have twenty drawings, with the larvæ, chrysalis, and moths complete for engraving, of species which feed by night, and secrete themselves in a hole either in the body or branches of a tree. There they lie hid all the day, and sometimes for several days together; for when they want to feed, they come out at night and gnaw off a small twig and drag it to their hiding-place to feed on at their leisure. They cover up their hole with a web in a very careful manner, so that it requires a careful person to find their hiding-place."

Wales, remarkable for their economy in the larva state, imitating in this respect the goat moths, Ægeriæ, &c., but differing from them materially in the winged state.* The wings are smooth and generally glossy; the antennæ of the males pectinated, but terminated by a thread at the extremity. The female antennæ are filiform; the palpi are curved up before the eyes, divergent, round, and terminating in a point; and the spiral tongue is described as short or not at all discernible. In several respects this genus seems allied to the Arctiidæ, but its true relations are doubtful.

The species here figured is distinguished by its dusky grey anterior wings, thickly speckled with brown and white dots, a conspicuous ear-like mark, and an angular patch of dark dots near the shoulder; the hind-wings are dark, with a silvery margin.

The eggs of this moth are deposited on the bark of the *Casaurina* figured, where some branch shoots from the stem; and the larva, when hatched, immediately enters into the bark, boring downwards a cylindrical cell to the centre of the stem, which it increases as it grows in bulk, and uses as a retreat and dwelling-place, weaving over its entrance a convex covering, in which is interwoven the ends of leaves, together with some of its excrement, as represented on the plate. This covering is fastened securely at the upper end, while the lower is left in

* The genus corresponds to Nycterobius of Macleay. We have placed it provisionally at the end of the Hepialidæ, in consequence of the similarity in the habits of the larvæ.

such a manner that the larva can pass and repass at pleasure. After sunset it goes in search of food, which it conveys, a leaf at a time, to its dwelling, where it is deposited by being dragged part down the cell. Thus the larva proceeds during the whole night, and on the approach of day retires with precipitation to its retreat, where it lies with its head towards the entrance, feeding on the leaves thus provided, and never ventures out during the day. In this retreat the larva also changes to a pupa in January, spinning no web, remaining in that state fourteen days, and the moth is on the wing in February. The pupa is figured at the bottom of the plate, in a section of its dwelling when in the larva state. The moth frequents the *Casaurina*, growing in barren forests. •

Mr. Lewin has described and figured the transformation of three other moths belonging to the same genus, and having the same habits, the characters and peculiarities of which we shall here subjoin.

C. ALBACOSTA.—Anterior wings silvery grey, the shoulder, thorax, and a broad margin on the anterior edge of a silvery white; a row of angular yellowish-brown marks near the exterior margin, with a faint ear-like mark and a dusky dot in the middle of the wing. From the shoulder runs an oblique cloud of chocolate dots or little tufts. Posterior wings brown, with a broad silvery white margin and fringe. Rather larger than *C. irrorata*; female expanding two inches and a quarter. Lewin, pl. 11.

The larva resides on the *Banksia serrata*, in the

large stems of which it bores deep cylindrical holes, generally in the axillæ of the branches. It sallies out only by night, and brings to its dwelling whole leaves of the broad foliage of this tree with dexterity and great labour, exhibiting many marks of sagacity in its progress, and when it arrives at the entrance to its retreat, it raises up the covering with its hinder parts and slips into its cell backwards, dragging the leaf after it, the extreme end of the stalk being held artfully in its jaws. It does not quit its hold till the leaf be almost entirely within its cell, where it fastens it down, together with the covering of the entrance, by a web. It changes to a pupa within this cell, in January, making no web; it remains thus thirty days, and is on the wing in February, when it frequents the tops of lofty trees.

C. RUBESCENS. — Anterior wings yellowish-clay coloured, tinged with rose-colour; posterior wings orange-yellow; abdomen with a square mark of red at the base. Expansion, female two inches; male, an inch and a half. Lewin, pl. 12.

The larva is a nocturnal feeder, like the rest of this tribe, and does not differ much in its habits from the preceding species. It lodges in the stems of the *Mimosa ensifolia*, having the entrance to its gallery secured by a covering of excrement, which is held fast, when the inmate is within, by a web. The leaves of the mimosa are lanceolate, and of such a length as to preclude the possibility of being taken wholly within; the greater part of the leaf

therefore is left out, and the larva hauls them gradually in as it consumes them. The pupa state continues for thirty-eight days, the moth appearing in the end of February. It frequents banks of rivers, ponds, and deep gulleys; these being the places where the trees it feeds on are usually found.

C. PULTENÆ.—Wings silvery-white, the anterior pair with three small black spots in the middle and a marginal row at the extremity; hinder wings black in the male, white in the female, with a series of angular black marks at the hinder margin: abdomen with a square spot of bright red towards the base. Expansion, male one inch; female, one inch and seven lines. Lewin, pl. 13.

The larva bores downwards a cylindrical chamber in the centre of the stem of *Pultenæa villosa*, Willd., having the entrance arched over with a fabric of web and excrement, under which, having taken its food thither in its nightly excursions, it feeds during the day in secret security.

Lewin informs us that all the larvæ of the genus Cryptophasa seal themselves in by an agglutinated covering across the cell or chamber where they transform to pupæ, through which, however, the moth can force its way from below; yet it is a strong bulwark against external foes, and effectually supplies the purposes of the old covering at the mouth of the cell, which falls off soon after the larva's final retirement. The group is named Cryptophasa, from the secret and secure manner in which this new and evidently natural division of moths

live in the larva state; reflecting on the singularity of which, we are struck at the wonderful means of self-preservation which the great Author of Nature has bestowed on different members of the animal creation, among which we know insects of every country abound with examples. The great enemy against which these larvæ take such precaution, is the *mantis* or walking-leaf, which abound in New South Wales, devouring multitudes of larvæ in the day-time. The natives also seek these wood-boring caterpillars as a delicious article of food, climbing high trees and searching for them with great labour.

In addition to the preceding species of Cryptophasa, Mr. Lewin has also described one of the Noctuidæ forming a section with the same name, in which the palpi are similar in form to those of the Bombycideous section, but the antennæ are thread-shaped in both sexes, and the tongue short and spiral, but sometimes scarcely discernible. The species is named *C. strigata*, and has light wainscot-coloured wings, the anterior with a brown stripe from the shoulder to the end, and the posterior with a broad silvery fringe, the whole insect being silvery, especially near the stripe. The larva of this species is provident and wood-boring, entering the sappy branches or slender stems of the *Banksia serrata*, where it forms a cell, having its entrance barricaded with a fabric of interwoven web and excrement; under which the larva conveys its food by nightly perambulations, that is, so much of a leaf of the above tree as it can con-

veniently convey away at a time, and which it partly forces down its cell, where in security it feeds and sleeps during the whole day. Within this dwelling it is transformed to a pupa, generally in January, remaining twenty-two days in that state, is on the wing in February, and is then found on Banksia shrubs near Sidney.

BOMBYCIDÆ.

THE family of the BOMBYCIDÆ (*Bombycites*, Lat.) contains an extensive assemblage of moths very varied in their aspect, but agreeing in having the organs of the mouth generally in a rudimentary or undeveloped state; the wings either extended horizontally or deflexed at the sides; antennæ of the males pectinated; larvæ naked, often with transverse insulated tufts of hairs rising from tubercles; 16-footed; living exposed on plants. When about to change to pupæ, they enclose themselves in cocoons of silk; and the pupæ are destitute of teeth on the margins of the abdominal segments.

Of all the genera included in this family, the pre-eminence must be assigned to Saturnia, whether we regard the number, size, and beauty of the species, or their utility to man. As at present con-

stituted it is of very great extent; but the most cursory glance suffices to show that its contents are far too heterogeneous to accord with the notion we now form of a genus. Without a full series of specimens, or more accurate descriptive details than we now possess, it would be impossible to make a satisfactory revision of the Saturniæ with a view to their distribution into consistent genera. But there are certain characteristic features affording a basis for this distribution to which it may be worth while briefly to advert. The hinder margin of the posterior wings is either regularly rounded, produced into an acute angle, or drawn out into a long narrow tail. As these distinctions are connected with others of an equally important although less obvious kind, they may be adopted for the establishment of three primary groups. Of these the first is by far the most extensive, including the great mass of the species, such as *S. atlas*, *hesperus*, *cecropia*, &c. To *S. atlas* and its congeners, distinguished by their great size, development of the palpi, large vitreous spaces on the disk of the wings, &c., we would assign the name *Hyalophora*,* a term nearly corresponding to *Porte-mirroir* of the French and *Spiegeldrager* of the Dutch. The great majority of the middle-sized and smaller species, in which the vitreous space is supplanted by an ocelliform spot (the British and continental species are examples), might retain the old name Saturnia; but even in the section thus restricted, there is room for further

* From ὑαλος, *vitrum*, and φερω, *fero*.

subdivision. Of those having the hinder wings produced into an angle, we are acquainted with only two species, *Epimethea* and *Erythrinæ;* and in the latter the peculiarity exists only in one sex. All the species with the hinder wings drawn out into a long tail are so dissimilar, that each must be referred to a different genus. In a brief and imperfect synoptical view, the two last mentioned sections may stand thus:—

A. *Hinder wings with an angular projection posteriorly.*

* In the male.

Gen. ARSENURA.*—Species *Erythrinæ*. Fabr. *Spec. Ins.*, ii. p. 169. No. 9.

** In both sexes.

Gen. LOMELIA.†—Species *Epimetheus*. Fabr. Drury's *Exot. Ins.*, ii. pl. 13.

B. *Hinder wings produced into a long tail.*

Gen. ARCTIAS (*Leach*).—Tail about the length of the body; fore wings subfalcate on their exterior edge.—Species *A. Luna*. Linn. Drury's *Exot. Ins.*, i. pl. 14. fig. 1.

Gen. EUSTERA.—Tail very long and dilated at the extremity; exterior line of the fore wings curved outwards.—Species *E. Argus*. Fabr. Drury's *Exot. Ins.*, iii. pl. 29. fig. 1.

Gen. COPIOPTERYX.‡—Tail very long, divergent, and dilated at the extremity; fore wings truncated at the apex.—*C. Semiramis*. Fabr. Cramer, *Pap. Exot.*, i. pl. 13, fig. A.

* From ἄρσην, *mas*, and οὐρα, *cauda*.

† An ancient proper name.

‡ From κωπιον, *remus*, and πτίρυξ, *ala*.

It may be thought that the strongly falcate shape of the anterior wings, in many of the Saturniæ, would afford a good mark of distinction; and in certain instances such may be the case. But this is a character that requires to be used with caution, for in many cases it is only a sexual distinction. A careful comparison of the two sexes in all the species we can find either figured or described, has convinced us that there are few genera in which the male and female present such marked differences. The male, as is usual among insects, is much smaller than the female, and the whole outline of his form is, so to speak, comparatively contracted. Hence there is almost always a strong tendency in the exterior line of the upper wings to be curved inwards, or assume a falcate shape. The outline of the female, on the contrary, is comparatively full, and the tendency of the line in question is rather in an opposite direction. The species, accordingly, in which the fore wings of the male are most decidedly falcate, have this form much less strongly marked in the female; where the former are not very strongly falcate, in the female they become subfalcate (*H. Promethea* may serve as an example); while the females of subfalcate winged males have the exterior outline of their fore wings either straight or slightly curved outwards. Nay, if our views regarding one of the species be correct, there exists an example of the fore wings of the male being strongly falcate, while those of the female are as obviously rounded laterally, describing a convex curve.

But the shape of the wings is not the only sexual difference. The colours of the male are always darker than those of the female, and the markings on a much smaller scale. Nay, some of the markings found in the one entirely disappear in the other. Thus the female of *H. atlas* has a small supplemental vitreous spot on the disk of the wings;* in many of the smaller species the form of the vitreous spaces is quite different in the two sexes; and there is commonly some additional bar or spots peculiar to the female. In short, when an attempt is made to unite the sexes to their legitimate partners, it must be kept in mind that this relationship has often no other external indication than an approximation in size, and a certain general resemblance in the design and colour of the wings.

In consequence of these considerations having been overlooked, there is reason to believe that the two sexes have sometimes been described as distinct species. Cramer committed this error in regard to *A. erythrinæ*, and it is not surprising that he should have done so, for they are remarkably dissimilar. A fine species from Assam has recently been described by the Rev. F. W. Hope, under the name of *Bombyx spectabilis*, and figured with his

* We are informed by Mr. Westwood that there is an article on the habits and variations of the sex of *H. atlas* in the "Actes de la Société Linnéenne de Bourdeaux, t. iv. 3d levraison. June 1830:" a work which we have not had an opportunity of consulting.

usual accuracy and elegance by Mr. Westwood, in the Linnean Transactions.* The individual figured is a female; we have seen another specimen of the same sex belonging to Mr. James Wilson, lately received from Serampore; and taking into account the prevailing character of the sexual differences in this group, it appears to us that there can be little doubt that this is the female of *Phal. Attacus, Lucina* of Drury, vol. iii. pl. 34, fig. 1.† Drury's insect is a male; all the specimens in this country of *Bombyx spectabilis* (as far as we know) are females; the size corresponds; and the *general character* of the colour and markings is similar. The fore wings of Lucina are strongly falcate, those of Spectabilis rounded laterally; and although this peculiarity is in no other instance that we are acquainted with so strongly marked, the considerations formerly adduced are sufficient to show that it is not incompatible with the view now taken of the supposed relationship of the two insects in question. The difference of the ascertained localities does not militate against this view; nearly all the Saturniæ have a wide geographical distribution; and it is judiciously observed by Mr. Hope, that the entomology of Africa (whence Drury obtained his *S. lucina*) seems to combine the character and possess some of

* Vol. xviii. Part Third, pl. 31. fig. 3.

† Since the above remarks were written, we have learned that the *B. spectabilis* of Hope has been previously figured by Gray in the Zoological Miscellany, under the name of *B. Wallichii.*

the leading characteristics of both continents, *i. e.* Africa and Asia; a remark in which all who have examined the insects of the two countries will not, we think, hesitate to concur. *

As far as we are acquainted with them, the caterpillars of this group are pretty similar to each other, having smooth skins, generally of a yellow or green colour, with transverse rows of tubercles of a different colour from the body. Considerable variations, however, from this typical form, are observable in many of the species. The caterpillar of *A. erythrinæ*, for example, is even more anomalous than the perfect insect, affording one of the most remarkable instances with which we are acquainted of important changes at different periods of development. If we may place full confidence in the figures which have been given of it, after having attained a certain stage of its growth, it is either yellow spotted with black, the head, legs, anal segment, and caudal horn ferruginous; or it is black, with the parts just mentioned ferruginous; or, finally, it is yellow with broad black rings. In all these modifications as to colour, it bears four very large black spines behind the head, and two others near the hinder extremity. † When full grown, all these spines fall off with its last change of skin, and the caterpillar is either black, yellow mottled with

* Linn. Trans., vol. xviii. p. 437.

† In Madame Merian's figures, the size of the spines is somewhat exaggerated. See the 11th plate of her Insects of Surinam.

black, or yellow with a round black spot on each segment; the head, a transverse oval spot on the segment behind it, the membranous legs, anal segment, and horn, in every case remaining ferruginous. Some of these states are represented on Plate I.: figs. 1 and 2, the larva when rather more than half grown; fig. 3, the full grown larva, after shedding its spines. On the same plate we have represented some other remarkable forms of the caterpillars of exotic moths. Fig. 4 is that of the species named *Bombyx molina* by Cramer, and figured in his 302d plate, E. F. Fig. 5 is the caterpillar of *Phal. Bombyx Nesea* of Stoll, remarkable for the brilliancy of its colours and a long dorsal horn projecting forwards. Fig. 6 is the caterpillar of *Bombyx netrix* of the same author, the moth of which is figured by Cramer on plate 307, fig. B.

The insects of this extensive family are called, *par excellence*, silk-spinning moths, because they produce silk in greater profusion than any other lepidoptera. They may be said to be almost the only insects, except bees, which it has been thought worth while to cultivate and domesticate on account of their utility to man. Besides the common silk-moth (*B. mori*), a great variety of other kinds are cultivated in various quarters of the world. Some of these we have figured and described. The great obstacle experienced in rendering their produce serviceable, is the extreme difficulty in unwinding the silk from the cocoon, owing to the tenacious quality

mity of the wings brown, appearing as if powdered; a round black spot is placed towards the tip having a light-coloured crescent within it, and there are several blood-coloured stains near it: a white zigzag line, accompanied with a blood-red streak, runs from this black spot to the anterior edge. The hinder wings are similar to the upper, but the white discoidal spot is larger, the transverse band broader, and bordered internally with white; the external margin dull buff-colour, with two faint black lines, and a row of transverse curved spots. All the markings described appear brighter and more distinct on the under side. The hinder wings are bordered along the anterior edges with white, that colour becoming broader as it approaches the shoulders.

The caterpillar is green, with the head, legs, and numerous projecting points over the body, yellow; there is also a pair of small blue spots on each segment. It feeds on the wild American plum (*Prunus Pensylvanica*) and spins its cocoon on a branch. The cocoon is larger than a pigeon's egg, of a yellowish-brown colour, the outer layer of silk rather coarse, the interior of finer texture. We are not aware that this silk has ever been unwound, but it has been carded, spun, and made into stockings, and Abbot states that it will wash like linen. The insect is rather plentiful in the neighbourhood of New York, but scarce in Georgia. The caterpillar has occasionally been reared by feeding it with the leaves of the apple-tree, but it is at all times difficult to make it flourish in confinement.

HYALOPHORA PROMETHEA.

PLATE XII.

Phalæna (Bombyx) Promethea, *Drury, Ins.*, vol. ii. pl. 11 male, plate 12 fem.; *Gmel. Syst. Nat.*, 2403; *Cramer, Pap. Exot.*, t. 75, fig. A., B., and 76, A. B.; *Palisot de Beauvois, Ins. d'Afrique et d'Amer.*, t. 21; *Peale's Lep. Amer.*, pl. 3 and 4; *Abbot and Smith, Lepid. Georg.*, pl. 46.

Although this fine moth has been figured in several general works, we have here given original representations of both sexes, in order to render the illustration of the transformations and singular economy of the species more complete. The figures of the larva, cocoon, and chrysalis are copied from the work of Mr. Titian R. Peale on the Lepidoptera of North America, of which, we believe, only a single number has been published, and which is scarcely known in this country.

The colour of the male, on the upper side, is dark chocolate brown; the exterior margin of all the wings light greyish brown, with a narrow waved line of black running through it not far from the margin; within this line the colour is lighter; about one-third from the tips, a narrow waved light grey line commences, and traverses all the wings, in a

Metamorphoses of Saturnia Prometheus

direction nearly parallel to their external edge; near the tip of each of the anterior wings there is a black spot surmounted by a blue crescent: hinder wings with a row of spots within the narrow black line skirting the outer border. The markings on the under side, in this sex, are similar to those just described; but the colour is paler, and the most considerable differences consist of a small transverse whitish spot in the centre of each wing, and in the grey waved line near the middle of the hinder wings being continued round, except on the abdominal edge.

The female presents important differences. The body is reddish-brown; on the upper side the half of the wings next the body is dark red, with a pretty large angular light-coloured spot towards the centre, and in the upper pair, a light-coloured bar runs out from the base, and after proceeding for some distance, bends towards the anterior border; a little beyond the middle, a light-coloured waved band runs across all the wings, bounded by dark chocolate on its inner edge; tips of the anterior wings with a black spot partly encircled with blue; the margin itself dark buff, with a narrow zigzag black line running through it; within this, on the under wings, is a row of irregular red spots. On the under side the body is streaked with white; the colours pale; the angular band wanting at the base of the anterior wings, and the light-coloured portions appearing as if sprinkled with fine grey powder.

The following is Mr. Peale's account of the habits

of this moth:—"During the present year (1833), this beautiful moth will be unusually abundant in the vicinity of Philadelphia, judging from the number of cocoons which are to be seen hanging from the branches of the sassafras (*Laurus sassafras*) and spice-wood (*L. benzoin*). The casual observer would no doubt suppose them to be merely withered leaves that have withstood the blasts of winter, for such they were evidently intended to resemble, by the little architect, when preparing its narrow cell. The naturalist, however, is not to be thus deceived, as a boy and myself collected from three to four hundred specimens during short winter rambles in the neighbourhood.

"The perfect insects appear about the end of May and beginning of June, at which time the leaves of the sassafras, spice-wood, and swamp button-wood (*Cephalanthus occidentalis*) have attained a sufficient size to afford a plentiful supply of food to the caterpillar; the parent insect most commonly selecting those trees for the sustenance of her future progeny, and depositing her eggs on or near the leaves which have been chosen for that purpose.

"The caterpillar casts its skin three or four times, increasing in bulk and brilliancy of colour with each change, and finally attains the size represented in the figure; it then loses the voracious appetite which had hitherto been its predominant character, and begins its preparations for the great transformation it is to undergo, by selecting a perfect leaf, the upper surface of which it covers with a

fine light yellowish brown silk, extending this coating, with great skill and foresight, over the footstalk of the leaf, and attaching it firmly to the branch, so as to secure the leaf from being separated by any accident. This preliminary operation having been accomplished, the caterpillar next draws the edges of the leaf together; thus forming a perfect external covering or mantle, in which it spins a fine strong durable cocoon of fine silk. In this habitation our little architect passes the winter, secure from birds and other enemies. (This is attempted to be represented in the upper right-hand figure of Plate XII.) As soon as the cocoon has been completed, the caterpillar again sheds its skin, and is transformed into a pupa or nymph, as represented in the partially opened cocoon figured in Plate XII. fig. 2. At first, the leaf enveloping the cocoon remains green, but soon changes to a red or brown colour, when it becomes brittle, and is gradually carried away by the winds and storms of the winter, until finally nothing remains except the cocoon itself, which is firmly suspended by the silk which once covered the footstalk of the leaf. The instinct of the caterpillar, in thus providing for the permanent attachment of its future habitation, appears to be superior to that shown by many other species.

"The caterpillar is of a delicate green colour, with yellow feet; each segment of the body, except the posterior, is marked with six blue spots, from which arise small black tubercles; in the second and third segments, however, the two centre tuber-

cles are replaced by club-like projections of a third of an inch in length, and of a bright coral red colour. The last segment is furnished with but five tubercles, the central one of which is of the same clavate form as those on the anterior segment, but is of a fine yellow colour. As before stated, they feed on the leaves of the sassafras, spice-wood, and swamp button-wood, and are to be found during most of the autumn months.

"The silk spun by this species is as fine, and is produced in as great abundance, as that furnished by the *Bombyx mori* (or the silk-worm usually reared for manufacturing purposes, and which was originally a native of Asia), but is of a darker colour, and will, it is feared, always present difficulties in reeling, from the manner in which part of it is attached to the branch."

SATURNIA ISIS, *Westwood.*

PLATE XIII.

On first drawing and describing this fine species, we thought that it was quite new, never having seen another specimen except one in the possession of Samuel Stevens, Esq., from which our drawing was made. But we have since learned that a figure

Saturnia Isis

of the female was published by Klug in 1836, in a a pamphlet of eight pages, published at Berlin, 4to. He names it *Saturnia maja*, but as the latter term has already been applied by Drury to another species, we think it better to retain the name by which it was originally designated by Mr. Westwood.

The wings measure very nearly six inches in expanse, and are of a very pale grey colour, especially the anterior pair, which are, however, almost entirely covered with fine black and brown hairs. The centre of these wings is ornamented with a small oval mark, half of which, towards the body, is covered with black scales, and the other half is vitreous; between this and the base is a very curved and irregularly dentate fascia crossing the wing, and immediately behind the eye is a nearly straight slender brown bar. This is succeeded by slender black wavy bars, the space between which and the apex of the wing is divided as it were into three compartments, the first of which is covered with small brown patches, the second is paler and covered with very fine black speckles, and the apical part is much darker, with large black specks. The apical margin of the fore wings is slightly scolloped; the hind wings are entirely covered on the upper side by a most magnificent eye-like spot, surrounded by successive rings of various colours. The oval pupil is black, but the part furthest removed from the body is denuded of scales, and would be vitreous, were not the under side of the

wings clothed with scales; this is surrounded by a narrow fulvous iris, then black, then a broader oval of dirty clay-colour, then a narrow oval of pale flesh-colour, then a broad rich claret oval ring; between this and the base of the wing is first a bar of flesh-colour, then black shaded into claret; towards the extremity of the wing the claret is succeeded by a half-ring of flesh-colour, then a narrow one of black, then of pale buff stone-colour, and another moderately broad of grey speckled with black. The thorax is dark and rich brown colour, with two white bands across the neck and two across the extremity of the thorax whitish; the abdomen is buff, with black dots. The margin of the wings is scolloped, and their external angle is considerably produced beyond the hind angle of the fore wings. The under surface of the wings of this magnificent moth is by no means equal to the upper side in the beauty of the markings, all the wings being of a very pale buffish white with dark speckles; the fore wings are marked nearly as on the upper side, but the hind wings have only a very small eye in the centre, having a black pupil with a fulvous orbit surrounded by a slender black circle; immediately connected with the posterior part of this eye is a curved row of brown arches, between which and the apex of the wings is another and more slightly marked series of black scollops.

The palpi are distinct, forming a small brown muzzle, but they are not visible from above; they,

1 *Saturnia Cynthia.*
2 ——— *Mylitta.*

as well as the rest of the head, are brown. The spiral tongue appears to be wanting; the antennæ are slightly bipectinated, being gradually more slender from about one-third of the distance from the base to the apex. The legs are short.

This insect seems allied to *Saturnia alenda*, Drury, vol. ii. pl. 19, and *S. phædura*, Drury, vol. ii. pl. 24 and 25, both of which are from Sierra Leone, but differing from both in the form of the wings.

In the possession of palpi, *S. Iris* agrees with Aglaia rather than Saturnia, but that is evidently a character of slight importance; the giant Atlas moth of China has similarly developed palpi, and yet nothing would be more absurd than to place these three species in one modern genus.

SATURNIA* CYNTHIA.

PLATE XIV. Fig. 1.

Phal. (Attacus) Cynthia, *Drury's Exot. Ins.*, ii. pl. 6. fig. 2; *Oliv. Ency. Meth.*

The expansion of the wings is about five inches: head and antennæ greyish-brown, the latter strongly pectinated; thorax and abdomen lighter grey; wings

* This and the following species might perhaps be included in Hyalophora, but as they deviate somewhat from the type of that genus, the old name has, in the mean time, been permitted to remain.

with a broad transverse light-coloured band near the middle, the space within which (forming nearly an equilateral triangle) is brownish-grey, and that without ash-colour, running into brownish-grey at the margins of the wings; just within the margins there are two narrow brown streaks running parallel with them, somewhat interrupted before reaching a black spot near the apex of the superior wings; this spot is surmounted by a white crescent, and a zigzag white line runs from it to the tip. The basal portion of the superior wings is traversed by an ash-coloured bar, commencing on the posterior edges next the shoulder, and after continuing nearly in a straight line for about half an inch, is suddenly deflected and terminates on the anterior margin; between this bar and the transverse serpentine line, there is a pale longitudinal spot surmounted with black. The under wings likewise bear a similar spot, but more crescent-shaped; and towards their base, there is an ash-coloured arched bar, bounded on the outer side with black. The under side differs principally in being paler and destitute of the angular and arched bars at the base of the upper and lower wings.

The caterpillar of this moth is the Arrindy silk-worm, for an account of which we are indebted to Dr. Roxburgh, who published an interesting memoir on the silk-producing moths of the East Indies in the 7th volume of the Linnean Transactions. The eggs are described by him as numerous, ovate, pure white, about the size of a large pin's head. They

1. Caterpillar of S. Cynthia.
2. ——— Do. ——— of S. Mylitta.
3. Pedunculated cocoon of the latter.

hatch in from ten to fifteen days, according to the temperature of the air. The caterpillars arrive at their full size, which is from two and a half to three inches, in the space of about one month; during which time they, like the caterpillars of the common silk-worm, cast their skin three or four times. They are also composed of ten segments: across the middle of each are several small, soft, conic-pointed tubercles; otherwise they are smooth and delicately soft. The prevailing colour pale or sea green. In this state they are very voracious, devouring daily many times their own weight of food. (The full grown caterpillar is represented on Plate XV. fig. 1.) The cocoon is white or yellowish, of a very soft and delicate texture; about two inches long and three in circumference, pointed at each end. Enveloped in this case the animal remains dormant from ten to twenty days, according to the state of the weather. The perfect insect issues from one end, and in that state exists from four to eight days, during which period it is wholly employed in the grand work of Nature, generation; remaining perfectly contented in its chamber, seldom attempting to fly away. In this respect it differs exceedingly from the Bughy and Jarroo moths.

The caterpillars, like the common silk-worm, are reared in a domestic state, and entirely fed on the leaves of the Palma Christi plant (*Recinus communis*). The filament of the cocoon is so exceedingly delicate as to render it impracticable to wind off the silk; it is therefore spun like cotton. The

yarn thus manufactured is wove into a coarse kind of white cloth, of a seemingly loose texture, but of incredible durability, the life of one person being seldom sufficient to wear out a garment made of it; so that the same piece descends from mother to daughter.

Dr. Roxburgh's correspondents furnished him with much additional information regarding this insect as a silk-producer. Mr. Atkinson states that he reared two parcels of them with a view towards winding off the cocoons, but all his endeavonrs to obtain cocoons that would reel off were in vain. He even brought a man from the country where this species of silk-worm is cultivated, and he laughed at Mr. Atkinson's endeavours to get cocoons to reel; asserting that it was impossible, and that they were always spun off into thread like cotton by the women only.

On the same subject Mr. Creighton writes as follows:—"The Palma Christi silk-worm goes by the same name as the plant does among the natives, which is *Arrindy*. They accordingly call it *Arrindy-worm*, *Arrindy-thread*, *Arrindy-cloth*, &c. They rear it in their houses much in the same way the silk-worm is reared. Their manner of spinning it is as follows:—Four or five of the cocoons are fastened to a stick stuck in the ground, or sometimes they hold it in their hand. These are united into one thread, and made fast to a piece of wood, with something heavy to make it spin round while suspended by the thread: when they let out suffi-

cient of the cocoons from their hand, it is twisted by this piece of wood spinning round, and when well twisted, it is wound round the wood, and another length let out from the hand. The cocoons are spun wet, but only with cold water. The cloth is woven in small pieces in a loom, and is as coarse as light vitree, but more open; and on being washed and beaten well, is made very soft and pliable. It is entirely confined to the districts of Dinagepore and Rungpore; no other place in Bengal having got it. Its uses are for clothing, for both men and women. It will wear constantly ten, fifteen, or twenty years; the merchants also use it for packing fine cloths, silks, or shawls. It must, however, be always washed in cold water; if put into boiling water, it makes it tear like old rotten cloth. There is a cocoon produced wild upon the mango-tree, which they gather, and mix with Arrindy cocoons in spinning. I have only seen one caterpillar of it, and did not succeed in rearing it. I shall inquire for some, and get a drawing made, if possible, as they cannot be sent or carried to any distance."

SATURNIA MYLITTA.

PLATE XIV. Fig. 2.

Phal. (Attacus) Mylitta, *Drury's Exot. Ins.*, vol. i. pl. 5, fig. I. —Phal. Paphia, *Cramer, Pap. Exot.*, pl. 146, fig. A.; pl. 147, fig. A. B.; pl. 148, fig. A.—Bombyx Mylitta, *Encyc. Meth.*

This species, like several others of its congeners, is liable to considerable variation both in size and colour. The expansion of the wings is usually between five and six inches, although individuals occur exceeding these dimensions (the figure on the plate above referred to is somewhat diminished). The colour of the wings is yellowish-brown, varying a good deal in tint; each wing with a round transparent ocellus in the centre, those on the fore wings largest, surrounded first by a yellow ring, then a greyish band, and lastly a black line, the transparent pupil divided by a fine dark line; the anterior margin of the superior wings is grey, the base with two abbreviated light-coloured bands, and a narrow dark streak, commencing near the apical angle, runs across all the wings parallel with the exterior margin and not far from it; a faint arched black streak is observable over each of the eyes on the under wings. The thorax and abdomen are

greyish yellow, the antennæ, which are strongly pectinated in the male, ferruginous. The colour of the insect on the under side is greyish-brown, and besides the markings nearly corresponding to these of the surface, there is a dark band commencing at the anterior edges of the upper wings and continued across the disk of both in a line with the eyes, terminating at the abdominal edges just behind the body. The upper wings are strongly falcate, particularly in the male.

The eggs of this valuable species are white, round, compressed, with a depression or pit in the centre on each side; the circumference crossed with rugæ, corresponding with the rings of the enclosed animal. They hatch in from two to four weeks, according to the state of the weather.

The caterpillars acquire their full size, which is about four inches in length and three in circumference, in about six weeks; they are of a yellowish-green colour, and composed of ten segments, of which the posterior one is in some degree bifid. There is a light yellowish coloured stripe on each side, which runs from the second or third anterior segment to the incisure of the last; immediately under these stripes, the middle five, six, or seven segments are marked with an oblong gold-coloured speck. The back is also marked with a few round darker coloured spots, and a few long, coarse, distinct hairs issue from these spots, with others of a smaller size scattered over the insect. When these caterpillars approach near their full size, they are

too heavy to crawl in search of their food with their back up, as is usual with most caterpillars, but traverse the branches suspended by the feet. (See Plate XV. fig. 2.)

When the caterpillars are ready to spin the cases in which they are to pass the chrysalis state, each of them connects, by means of the recent glutinous filament of which the case is made, two or three leaves into an exterior envelope, which serves as a basis to spin the complete case or cocoon in; besides, the case is suspended from the branch of the tree in a wonderful manner by a thick, strong, consolidated cord, spun of the same material, from the bowels of the animal. (This pedunculated cocoon is represented on Plate XV. fig. 3.) This case is of an exact oval shape and exceeding firm texture; in it the animal remains dormant and perfectly protected for about the space of nine months, viz. from October till July, so that they make their appearance in time for the caterpillars to come into existence when Providence has furnished them with the greatest plenty of proper food, viz. during the months of August, September, and October. When the insect is prepared to make its escape and be changed to its perfect state, it discharges from its mouth a large quantity of liquid, with which the upper end of the case is so perfectly softened as to enable the moth to work its way out in a very short space of time; an operation which is always performed during the night.

The perfect insect, according to Dr. Roxburgh, to

whom we are indebted for the above information, as well as for what follows,* does not live for more than from six to twelve days, at least in a state of confinement. It takes no nourishment whatever, not having any mouth or channel by which food could be received. When the female is impregnated, she deposits her eggs on the branches of the tree she may be resting on, to which they adhere firmly by means of the gluten they are covered with when newly laid.

This insect is a native of Bengal, Bahar, Assam, &c. The caterpillar feeds on the leaves of the *Rhamnus Jujuba (Byer* of the Hindoos), and on those of *Terminalia alata glabra*, known to the Hindoos by the name of *Asseen*. It is found in such abundance over many parts of Bengal and the adjoining provinces, as to have afforded to the natives, from time immemorial, an abundant supply of a most durable, coarse, dark-coloured silk, commonly called *Tusseh-silk*, which is woven into a kind of cloth called *Tussey doot'hies*, much worn by Bramins and other sects of Hindoos. The following more detailed account of this interesting and valuable insect, is from a letter published by Dr. Roxburgh, which was written by Mr. Atkinson to a Mr. Pope of Mahometpore. In reply to the questions that had been addressed to him, the writer states:—

"1st, That the cocoons of the insect, which feeds on the Byer leaf, are called by the natives Bughy,

* See Linnean Trans., vol. vii. p. 33.

producing a Tusseh silk. They are annual, and are said to remain in the cocoon nine months, and to be three months in the egg and worm state.

" 2d, That the species cannot be domesticated; the natives apparently not being able to retain any of it for seed. The hill people say that they go into jungles, and under the Byer and Asseen trees they find the excrement of the insect; on which they examine the tree, and, on discovering the small worms, they cut off branches of the tree sufficient for their purpose, with the young brood on the branches; these they carry to convenient situations near their houses, and distribute the branches on the Asseen tree in proportion to the size thereof, but they put none upon the Byer tree. The Paricahs, or hill people, guard the insects night and day while in the worm state, to preserve them from crows and other birds by day, and from bats by night.

" I have myself seen them," continues the writer, " thus watching the brood. This species cannot be confined, for so soon as the moth pierces the cocoon it gets away; and the people add, that it is impossible to keep it, by any precaution whatever.

" To wind off these cocoons, they put them into a ley made of plantain ashes and water, for about two hours, after which they take them out of the ley, and put them in their wet state into an earthen pot; those which are properly softened are first applied to the reel, and so on, as the cocoons become soft, for four or five days, till the whole are wound off.

"The implement used for taking off the thread is a small common reel of four bars. The cocoons are laid in a smooth earthen dish, without water; the reel is turned by the right hand, whilst the thread of four or five cocoons passes over the left thigh of the spinner, and he gives the thread a twist with his left hand upon his thigh. The operation is this instant in my sight, with a thread of five cocoons, the produce of another species called Jarroo, and described below, but the reeling is exactly the same as that of the Bughy, and therefore one description answers for both. I must add, that the thread is exceedingly apt to come off double and treble for several yards together, which is not regarded by the natives, as breaking off double threads would diminish the produce, and, moreover, would occasion loss of time: a very even thread, however, may with care be reeled from either the Bughy or Jarroo cocoon.

"The Jarroo cocoons, just alluded to, are so called from being produced in the coldest month of the year, say January; the Bughy being about a month before them. The Jarroo are likewise annual, and the history of them is nearly the same as that of the Bughy; they are, however, different, as I am assured. The Jarroo will eat the Byer leaf if he cannot get the Asseen, but he will always prefer the latter, and produce a better cocoon when fed on it. His silk is more of a dull colour than that of the Bughy, which latter worm the hill people put on the Asseen alone, not because it prefers it to the

Byer, but because they have greater plenty of Asseen than Byer, and, moreover, trim and dress out plots of Asseen on purpose for the worms. The principal difference between the above two species is, that the natives retain a part of the Jarroo cocoons for seed; these they hang out on the Asseen trees when the proper season of the moth arrives; when the moths come out, the male insects invariably all fly away, but the females remain on the trees. These are not impregnated by the males bred along with them, but, in ten or twelve hours, or perhaps one, two, or three days, a flight of males arrive, settle on the branches, and impregnate the females; by the bye, the hill people calculate good or ill fortune in proportion to the speedy or tardy arrival of the stranger males. These insects die as soon as the purposes of Nature are effected, and the females live only to produce the eggs on the branches of the trees, and then expire. In regard to the Bughy species, they all take flight, females as well as males, and hence the natives firmly believe that they are all males, though I cannot see any physical reason for supposing them so. I have frequently endeavoured to detain the males of the Jarroo species, and have kept them locked up in a box for that purpose; but whether they did not like to make free with their female relations, or from what other cause I know not, but I never could obtain a breed in the domestic state, and the efforts of the male to escape were wonderful, and at last always effectual. The accounts given by the natives of the distance to

which the male insects fly are very astonishing. I have put, at different times and occasions, innumerable questions to them on this subject, and they assure me that it is no uncommon practice amongst them to catch some of the male moths and put a mark on their wings previous to letting them fly, the marks of different districts being known. I am told that it has been thus ascertained that male moths have come from a distance equal to a hundred miles and upwards: I of course cannot vouch for the truth of this, but have no hesitation in declaring that I believe it. The Jarroo worm is guarded on the trees in like manner as the Bughy; this I have had opportunities of seeing on the hills westward of me: the cocoons are darker coloured than the Bughy species, and are wound off as described above. The accompanying skein I had reeled off at my elbow this morning; it consists of five Jarroo cocoons at first, of four when one cocoon was finished, and of three when two cocoons were ended; I then stopped the reel; the three that remained of course gave a filament the entire length of the skein."

The Tussey silk is extremely well adapted for general wear in warm climates, as it makes a dress a once cheap, light, cool, and durable.

SATURNIA MAIA.

PLATE XVI. Fig. 1.

Phal. (Bombyx) Maia, *Drury's Exot. Ins.*; *Cramer, Pap. Exot.*, pl. 98, fig. A.—Bombyx Proserpina, *Fabr. Abbot and Smith's Lepid. Georg.*, pl. 50; *Encyc. Meth.*

This species is of comparatively small size, but it is rendered very conspicuous by the strongly defined character of its colours. It seldom expands much beyond two inches and a half; head and antennæ black, the latter strongly pectinated. Wings thin and filmy, nearly transparent, black, with a broad white bar running across the centre; the anterior pair having a half-formed eye on the inner side of the white bar, and the posterior an angular black spot on the white bar, before the middle. Thorax light grey anteriorly, the other parts black; abdomen likewise black, the extremity orange. On the under side the abdomen is grey, with white spots at the side, extremity orange. Legs black, thighs orange.

The caterpillar (Plate XVI. fig. 2) frequents the red oak (*Quercus rubra*, Linn.), as well as other American species of Quercus. They vary much in colour, according to age. That figured on the plate

1 2 Saturnia Maia
3 Aglia Io

referred to is yellow, with a broad dark-coloured stripe along each side, and two reddish tubercular spots on the back of each segment; head, anal segment, and legs purplish-red; each segment with a series of setose spines. We are informed by Abbot that this moth is called in America the Buck-fly, from an erroneous vulgar notion that bucks breed its caterpillar in their heads and blow them out of their nostrils. This opinion originated from the fly coming out in the rutting season, while the bucks are pursuing the does. The hunters therefore take notice of the insect, in order to know the proper season for their sport, which is later in Georgia than in Virginia, as is the appearance of these flies. They are much the most plentiful in the last mentioned country. One of the caterpillars in Virginia went into the ground the 1st July, and came out 20th October. In Georgia the same species buried itself June 14th, and the fly did not appear till December 8th, after which other individuals kept coming out from time to time till February 16th. The male appears by day, and flies very swiftly, mounting and descending. The caterpillar stings very sharply: when small, the whole brood feed together, but they disperse as they grow large.

AGLIA IO.

PLATE XVI. Fig. 3.

Bombyx Io, *Fabr.*—Phal. Io, *Abbot and Smith's Lepid. Georg.*, vol. i. pl. 49.

The genus Aglia was founded by Ochsenheimer on the *Bombyx Tau* of authors, and is very closely related to Saturnia. It has the palpi distinct, rather short, clothed with scales, compressed, triarticulate, terminal joint short, ovate; maxillæ obsolete. Antennæ short; those of the male bipectinated, each joint bearing a simple pectination, the latter diminishing in length towards the apex of the antennæ; those of the female with each joint unidentate, not pectinated; head moderate; thorax rather short and pilose; abdomen moderate, pilose, tufted at the apex; wings entire, broad, horizontally expanded. *

The finely coloured species figured is a native of America. Antennæ, head, and thorax yellow, the two latter hairy; upper wings yellow in the male, with several waved transverse brown streaks; reddish-brown in the female, with three waved continu-

* Stephen's Illus. of Brit. Ent. Haus., vol. ii. p. 36.

ous yellow lines across the surface, and a cluster of small yellow spots towards the centre. The upper wings are yellow beneath, with a black ocelliform spot in the middle, with a white pupil, behind which is a transverse reddish ray. The under wings are yellow above, with a large central ocelliform spot, which is black, with a white elongated pupil; behind this eye there is a black semicircular band, succeeded by another parallel one which is ferruginous; the inner margin of the wing is likewise ferruginous. On the under side the wings in question are yellow, with a transverse ferruginous ray.

The caterpillar is rather thick and fleshy; light green, with a lateral stripe of ferruginous and white, commencing at the fourth segment from the head and terminating at the anus; each segment bears a transverse row of large tufts of hair. It may be called polyphagous, feeding on Indian corn, dogwood, sassafras, &c. The pupa is very dark brown, approaching to black, and if Abbot's delineation be correct, free from hairs. The author just alluded to found the caterpillar spin up on 27th September, and the fly appeared on the wing on the 17th of May, and continued coming out at different times till the 15th of August following. The caterpillar stings very severely, and encloses itself in a brown web on the leaves. It is not very common, and is a very tender fly to keep in cabinets, the male sooner decaying than any other. When young, the caterpillars feed in large companies, but ultimately become solitary.

The nearly allied species *Aglia Tau*, has the wings testaceous, with a large discoidal subviolaceous ocellus on each, having a white mark like the letter T as a pupil. It is a native of Europe, and was introduced by Martyn, in his Aurelian's Vade Mecum, as a native of Britain; no doubt through some mistake, for his statement has never been confirmed.

CERATOCAMPA IMPERIALIS.

PLATE XVII. Fig. 1.

Bombyx imperialis, *Fabr. Gmel.*—Phalæna imperatoria, *Abbot and Smith, Lepid. Geor.*, ii. pl. 55.—Ceratocampa imperialis, *Harris, Westwood's Drury*, i. pl. 9, figs. 1, 2.

This genus was proposed by Kirby, under the name of Cerocampa, for the reception of the insect above named, and that delineated on the following plate. The term was subsequently changed by Dr. Harris (Append. to Hitchcock's Geology of Massachusets) to that above used (derived from κεραται, *cornua*, and καμπη, *eruca*), and the change has been sanctioned by some recent authors adopting it. Although Kirby designed the genus as constituted by him to include both *B. imperialis* and *B. regalis*, Fab., nei-

1 Ceratocampa imperialis.

2. 3 Harpyia Bankstiae & Caterpillar.

ther the appearance of the caterpillars, chrysalides, nor the form of the wings in the perfect insect, will fully authorise this, and we have accordingly given another generic designation to the latter.

The antennæ of *C. imperialis* are reddish-brown; head, thorax, and abdomen yellow, the two latter with various clouds and spots of light reddish-brown with a purple gloss. The upper wings are of a beautiful bright yellow, with several large patches and numerous small rounded spots of reddish-brown glossed with purple sprinkled over the surface; the dark clouds vary somewhat in their size and form, but commonly there is a broad patch occupying the external margin of the wing, from which a curved band runs down the middle and turns forward to the anterior edge near the centre, from which it follows the margin to the base; the whole of the latter is occupied by a large cloud. The ground colour of the hinder wings is likewise bright yellow, with a purplish-brown cloud near the base, a brown eye with a small light spot in its centre on the disk, and beyond that an undulated bar of purple-brown; there are likewise many irregular specks scattered over the surface, most numerous beyond the transverse bar. The under side is of the same bright yellow as the upper, with sprinkled spots of brown, each wing with a reddish-brown eye in the centre, that on the upper wings having a round brown spot above it; all the clouds, however, have disappeared, except that along the exterior and anterior margins. Expansion of the wings from

four to six inches, the female considerably larger than the male.

The caterpillar, which is well figured by Abbot and Smith (vol. ii. pl. 55), varies very much in colour, being sometimes, as these authors express it, tawny like a negro, at other times orange and tawny, and occasionally green. It has two short rugose horns on each of the second and third segments, and some minute sharp points on the others, from which pretty dense tufts of long rigid hairs arise. There is a small yellow spot, surrounded with a black ring, on the side of all the segments, except the three immediately behind the head. It feeds on the plane-tree (*Platanus occidentalis*, Linn.), likewise on the oak, liquid-amber, and pine. The species breeds twice a-year, in June and September. "The caterpillar," says Abbot, "went into the ground September 16, and came out July 4th. The caterpillars are not common, and are the most difficult of all to bring to perfection in confinement, as they will not eat in that situation; and even if they change into a chrysalis, they die afterwards."

Dorycampa regalis

DORYCAMPA* REGALIS.

PLATE XVIII.

Bombyx regalis, *Fabr.*—Phal. regia, *Abbot and Smith, Lepid. Georg.*, ii. pl. 61.—Cerocampa regalis, *Kirby.*

THIS moth is among the largest of the nocturnal Lepidoptera of America, and in many respects a remarkable one. From the thickness of the body and general aspect it is not unlike a gigantic Cossus. The figure on the annexed plate is that of a female, somewhat reduced in size. The antennæ of the male are pectinated, those of the female setaceous. The wings are rounded on their external margin, but considerably more so in the female than the male. The ground colour of the upper wings is greyish-brown, of a deeper or lighter tint in different individuals, with a series of large yellow patches rather behind the middle, others of smaller size at the base, and two or three towards the centre; all the nervures are accompanied with a regular reddish stripe. The under wings are reddish-brown, the nervures red, a few yellow clouds anteriorly, an indistinct yellow band beyond the middle, and a series of black angular spots towards the hinder extremity. Head yellow; thorax reddish-brown, with a band in front, two diverging dorsal stripes, and two spots

* Δορυ, *hasta*, and καμπη, *eruca*.

behind, yellow. Abdomen reddish-brown, each segment with a yellow band. The female often measures half a foot between the tips of the wings, the male somewhat less.

The caterpillar when full grown is about five inches and a half in length; of a yellowish-green colour, inclining in some places to blue, each segment armed with a few black setose spines. On the three segments immediately behind the head, the spines are of very great length, curved and granular, the upper half black, the under reddish-yellow.

When the caterpillar raises its head, and draws the anterior segments together, as it is in the habit of doing when disturbed, it has a very formidable appearance, the spines forming a kind of crest over its head. At the same time it shakes its head from side to side as if preparing to make an attack on its assailant. By the natives of Virginia it is called the Hickory Horned Devil, and Abbot states that they are so afraid of it that he never saw one who would venture to handle it, people in general dreading it as much as a rattle-snake. "Nevertheless," he adds, "it is perfectly harmless, neither stinging by its horns nor any other part. When I have handled this animal in the presence of the negroes, to convince them it was innocent, they would reply that it could not sting me, but would them."

When the caterpillar changes its last skin, the horns fall off along with it. It feeds off Persimmon (*Diospyros Virginiana*, Linn.), walnut, hickory, and sumach. Abbot found one to enter the ground on the 16th June, and the fly came out on the 27th July; another on the 5th August, and remained in the chrysalis till May 9th. The chrysalis is comparatively short and thick, with a small mucro at the tail, and the edges of the segments without spinulæ; in these respects differing much from the chrysalis of *C. imperialis*, which is rather narrow and elongated, the tail of considerable length and bifid at the extremity, and the edges of the segments armed with a regular series of spines.

HARPYIA? BANKSIÆ.

PLATE XVII. Fig. 2.

Lewin's Lepidopterous Insects of New South Wales, pl. 9.

We believe that this conspicuous moth has been referred to the genus Harpyia by Boisduval, but it may well be questioned whether that be its proper situation. It seems to offer sufficiently distinct marks to form the type of a new genus.

The male expands upwards of two inches, the female three inches four lines. The upper wings are of a leaden colour, slightly glossed with purple, having several black marks, and freckled here and there with white and orange dots, and several clouds and dashes of the same. The hinder wings are brown and glossy in the female, whitish and silvery in the male, the base tinged with orange. Thorax black, with two large white patches spotted with red anteriorly; abdomen orange, with a rounded black spot at the side of each segment, and the hinder extremity black.

The caterpillar (Plate XVII. fig. 3) is a very beautiful one and bears considerable resemblance to that of a sphinx both in form and markings. The

colour is greenish-yellow, each segment with an oblique whitish stripe directed backwards. All the segments have round white spots surrounded with black on the lower parts, and on each side rather above the middle, from the fourth to the eleventh segment inclusively, there is a cluster of three or four round white spots placed on a black ground. The anal segment bears a small black horn, and wants the upper lateral spots. This caterpillar feeds on the *Banksia Ilicifolia*, and when near its transformation, it is, to use Lewin's words, of considerable bulk, very showy, and in general a great devourer. He found it change to a pupa in February, spinning on the surface of the earth a slight web or cell, and collecting about it some fragments of earth and leaves in order to disguise it. It remained in this dormant state thirty-six days, and was on the wing in March. The moth occurs in the neighbourhood of Sidney.

ARCTIIDÆ.

Many of the families into which the nocturnal Lepidoptera have been divided by authors, however distinct they may appear when viewed at their extreme points of difference, comprise species of so ambiguous a character, that it is not easy to pre-

scribe a definite line of boundary. The characteristic peculiarity of the Arctiidæ, however, is, that they have the wings deflexed in repose, the posterior pair not extending beyond the costa of the anterior, and they are connected together by an apparatus consisting of a kind of ring in the one which receives an elastic spine from the other, thus forming a connexion, but still admitting of considerable independent motion. The antennæ are bipectinated, sometimes serrated; palpi rather small, mostly triarticulate; spiral tongue generally short, and sometimes altogether wanting. The caterpillars of the more typical species are densely clothed with hairs; sometimes with long fascicles or tufts of peculiarly formed hairs; and in some cases they are naked. They feed externally on plants.

This family corresponds to the FAUX-BOMBYX *(Pseudo-Bombyces)* of Latreille. It comprehends a great number of species, many of which are conspicuous from their rich colouring, but they never make any approach to the size of the gigantic Bombycidæ.

1 Arctia Hebe
2 Spilosoma Aryc
3 ——— Virgo
4 Cater. of do 5 Chrys. of do

ARCTIA HEBE.

PLATE XIX. Fig. 1.

Shrank, b. ii. 152.—Bombyx Hebe, *Linn. Hubner*, *Bo.*, pl. 30, fig. 129; *Roesel*, *Insecten Belustigung*, iv. t. 27, figs. 1, 2; *Goedart*, *Pap. de France.*

This insect, belonging to the same genus as the well known Great Tiger Moth of this country, has been mentioned by several authors as a native of Britain, but although occuring in several parts of the continent of Europe in some plenty, there is no authenticated instance of its having been found here. It is a handsome insect, measuring two inches and a quarter between the tips of the wings; the anterior pair of the latter deep black, with five irregular white bars, the two exterior ones united by a longitudinal white bar. The posterior wings are deep red, with several abbreviated irregular black fasciæ; the fringe likewise black. Head and thorax deep black, the collar bright red; abdomen of the same colour as the hinder wings; the apex and a broad dentate band down the back black.

Several varieties are described by Goedart; 1st, one in which the third band of the upper wings is

sometimes wanting, at other times replaced by a mere point; 2d, one in which the bands and spots of the under wings are bordered with yellow; and, 3dly, one having more black than red in the under wings; but this is of rare occurrence.

The caterpillar is black, with tubercles of the same colour, each of them bearing a pretty long hairs, which are grey on the back, greyish-yellow on the sides, and deep red near the belly. It feeds on a great variety of common plants, such as dandelion, millefoil, &c. It passes the winter unchanged, its metamorphoses taking place about the beginning of May in the following year. The cocoon is white and soft, but rather densely woven; the chrysalis black.

The Hebe moth (so called from Ηβη, *youth*, on account of its beauty) is not rare in many parts of the continent of Europe, but is most plentiful in the south. In France it is common in the vicinity of the Mediterranean, becomes rarer in the central provinces, and is confined to particular localities in the neighbourhood of Paris.

1 Spilosoma acrea 2 Caterpillar &c

ARCTIA OCULATISSIMA.

PLATE XX. * Fig. 4.

Bombyx ocularia, *Fabr.; Cramer*, t. 344, fig. D, and vol. v. pl. 41, fig. 3.—Phal. oculatissima, *Abbot and Smith, Lepid. Georg.*, ii. pl. 69.—Phal. Noct. Scribonia, *Stoll.*, pl. 41, fig. 3. —Bombyx chryseis? *Encyc. Meth.*

The Great Leopard Ermine Moth, like several others of the same tribe we have figured, is a native of Georgia and other parts of North America, but it does not appear to be very common. The wings of the female expand three inches three quarters, those of the male nearly an inch less. Antennæ black; head white, with a black point on each side near the insertion of the antennæ. Thorax with ten or twelve black spots, some or all of them with a pale bluish-white centre, making them appear annular; the two hinder spots largest, and somewhat curved. Ground colour of the wings white, the surface of the upper pair variegated with black spots, most of which are ocular, placed irregularly towards the base, but having a tendency to form transverse rows externally; the hinder wings also white, with a few faint black spots behind. The abdomen is blue-black, variegated on the back

and sides with orange-yellow; legs white, the extremities with black rings.

The caterpillar feeds on the wild sun-flower (*Polymnia tetragonotheca?*), wild cherry, persimmon (*Diospyros Virginiana*), and several other plants. When young, it is one-half orange-coloured and the other black. At its full growth it becomes brownish-black, with an orange-red band along each side; the incisures of the segments and legs likewise of that colour. The hairs are placed on tubercles alternately nearer the anterior edges of each segment, so that they form a pretty broad band, and leave the rest of the body naked. When about to change to a chrysalis, it spins a thin gummy yellow web, something like that constructed on the same occasion by our common tiger-moth. Some observed by Abbot spun on the 14th March, and came out on the 18th of April; others spun on the 15th of June, and appeared on the wing July 7th.

It might be supposed from the general appearance of this moth that it would be a Spilosoma, but the caterpillar and chrysalis indicate a closer relation to Arctia. The species figured by Cramer under the name of *Cunigunda* is closely allied to it; but the latter is of smaller size, has the annular spots tinged with brown in the centre, and the abdomen is variegated with brown. It is a native of Surinam, Cayenne, &c.

SPILOSOMA ACREA.

PLATE XX. Fig. 1.

Bombyx acrea, *Fabr.*—Phal. acrea, *Abbot and Smith, Lepid. Georg.*, pl. 67.—Spilosoma acrea, *West. Drury*, i. pl. 3, figs. 2 and 3.—Arctia Pseudermines, *Peck.*

This genus (the name of which is derived from σπιλος, *macula*, and σωμα, *cropus*) was first named by Mr. Stephens, in his Illustrations of British Entomology, and characterised in the following manner: Palpi short, a little descending, triarticulate, the two basal joints very hairy, the terminal scaly, the basal joint somewhat longer than the second, the apical rather small, oval, subconic; maxillæ short; antennæ slightly bipectinated in the males, serrated in the females, each articulation with a bristle at the apex; head rather small, hairy; thorax and abdomen rather stout in both sexes, the latter slightly tufted in the male, acute in the female; wings trigonate, deflexed, and opaque; legs moderately stout; anterior tibiæ short, with a spine internally, the four posterior with spurs at the apex. Larva slightly tuberculated, each tubercle producing a whisker of hairs; pupa obtuse, folliculated.

It contains a great number of species both British and foreign, remarkable for their beautiful white

colour, spotted with black; on which account they have been named Ermine and Leopard moths. Like the tiger-moths, to which they are nearly related, they are subject to great variety in their markings, even in the same species; of the common British species, *S. menthastri*, not fewer than eight well marked varieties have been described.

The wings of the male of *S. acrea* expand about two inches, those of the female two inches three quarters. Head, thorax, and upper wings of the male cream-coloured, the surface of the latter with numerous small black spots, five of which are placed in a regular row along the anterior border, and six on the external one; hinder wings entirely yellow, with a few black spots near the external edge and middle. The abdomen is yellow, with a row of black spots down the centre, and another on each side; the apex cream-coloured.

In the female all the wings are white, with numerous black spots, which are very variable in their distribution, but there is a marginal row on the hinder wings which does not exist in the other sex. The abdomen is coloured nearly as in the male; eyes and antennæ in both sexes black.

The caterpillar is said to be white when young, and to become nearly black when full grown, a transition to two extremes which is not common even among a race of creatures subject to great variation in regard to colour. In its intermediate stages, the prevailing hue is reddish-brown. When it has attained the period of its growth at which we

have figured it (Plate XX. fig. 2), it is brownish-black, with two yellow lines along the sides, and a transverse series of orange-coloured spots on each segment. From the back of each segment arises a scopiform tuft of blackish hairs, of considerable length. The cocoon is oblong, and of a yellowish-brown colour. (Plate XX. fig. 3.)

This insect is pretty nearly related to one or two species of the same genus common in Britain. It seems to be very plentiful in several parts of America, particularly in Maryland, Virginia, and the vicinity of New York. Abbot states that he found the caterpillar on the cancer weed (*Crotularia perfoliata?*) in May, but that it is a general devourer of almost all field and garden plants and weeds. It spun up, in a thin web intermixed with its own hairs, on the 16th of May; the moth came out June 2. Others of the autumnal brood, taken in September, spun on the 18th of that month, and remained in the chrysalis till the 21st of April. The moth is less frequently seen than the caterpillar, as every one must have observed to be the case with our own tiger-moth (*Arctia caja*). Dr. Harris, an American entomologist, has published an account of this caterpillar in the Massachusets Agricultural Repository, under the title of "The Natural History of the Salt-marsh Caterpillar," the name by which it is generally known. It is extremely destructive to almost all kinds of grasses. "When nearly full fed," says the author alluded to, "they become very voracious, and continue eating

all the day and night without intermission. Soon they leave the meadows, aggregated in great numbers, and commence the wandering state, or begin to run, as is the phrase, devouring every thing in their progress; corn-fields, gardens, and even the coarse and rank produce of road-sides, afford them temporary nourishment, until they have found a place of security from the wind and weather.[*]

SPILOSOMA ARGE.

PLATE XIX. Fig. 2.

Phalæna (Noctua) arge, *Drury*, vol. i. pl. 18, f. 3.—Phalæna (Bombyx) Dione, *Fabr.*; *Abbot and Smith*, *Lepid. Georg.*, vol. ii. pl. 63.

NEARLY all the Tiger and Ermine moths are subject to great variation in their markings, but the present species seems to exceed even the usual limits in this respect. The ground colour of the upper wings and thorax is generally cream-colour, at other times it is of delicate pink; the surface variegated with numerous black lines and angular spots. The hinder wings are either cream-colour or tinged with red, having a fulvous marginal line and many oblong black spots posteriorly. The antennæ are black at

[*] Quoted in Westwood's Drury, i. 7.

the extremities; neck red, with two small black streaks above it; thorax with a black stripe in the centre and another on each side; abdomen with three rows of black spots, those along the back being largest. Anterior thighs red, having two black spots on them close to the head.

Abbot has given an accurate delineation of the caterpillar. It is dark brown, with five pale or yellow longitudinal stripes, each segment bearing a transverse row of fulvous tubercles from which springs a dense tuft of brown hairs. It feeds on a great variety of plants, but it seems to prefer plantain *(Plantago major)*, Indian corn, and pease. A specimen kept by Abbot was hatched on the 23d of July, spun the 28th August, and the fly appeared September 9th. The chrysalis has five reddish bands, and terminates in a small mucro.

SPILOSOMA VIRGO.

PLATE XIX. Fig. 3.

Phalæna Virgo, *Linn.*; *Abbot and Smith, Lepid. Georg.*, ii. pl. 62. —Bombyx Virgo, *Fabr.*; *Encyc. Meth.*

The antennæ of this handsome moth are ferruginous: thorax cream coloured or fulvous, with three broad black stripes, and two small spots of the same

colour over the eyes. Anterior wings black, with numerous cream-coloured or fulvous stripes dividing the ground colour into many triangular, quadrate, and linear spots. The hinder wings are reddish-yellow, with several large angular black spots towards the posterior margin. Abdomen reddish or fulvous with a macular or continuous black band down the centre.

The caterpillar is brown, with several yellow tubercles on each segment, bearing tufts of hair: head and membranous legs yellow. (Plate XIX. fig. 4.) It feeds," says Abbot, " on several species of mimosa, commonly called the sensible briar, panting briar, &c., as well as on some other plants. It spun up June 10th, and on the 20th September the moth came out. In Virginia it spins in April, and comes forth in May. This is not a common kind. The caterpillar, when kept in confinement, is apt to die before it changes to a chrysalis." The chrysalis is of a delicate lilac colour. (Plate XIX. fig. 5.)

1.2 Limacodes Oppus & Caterpillar
3. & Ecnomidea pithecium & Cater.

LIMACODES CIPPUS.

PLATE XXI. Fig. 2.

Phalæna Cippus, *Cramer, Pap. Exot.*, i. pl. 53, fig. E.—Bombyx Cippus, *Fabr., Abbot and Smith, Lepid. Georg.*, ii. pl. 73.

The generic name (which signifies resembling a snail) refers to the appearance of the caterpillar, which is one of the most singular of the nocturnal Lepidoptera. It is destitute of feet, properly so called, their place being supplied merely by a few protuberances; and along the under side of the body there is a soft pliable membrane, always covered with a kind of glutinous matter, by means of which and the aid of the protuberances the creature is enabled to slide rather than creep over the surface of a body. The back appears composed of three parts, the intermediate of which is separated from the others by a kind of keel, and is oval, a little pointed at both ends; the lateral parts projecting a little beyond the edges of the body, properly so called, and forming a kind of ledge when viewed from below. The head is entirely retractile, and concealed under a circular portion of the ledge alluded to, which hangs over it like a kind of hood.

The oval form of the body, and general appearance, make these larvæ somewhat to resemble an *Oniscus*, on which account they are named *Chenilles-cloportes* by French authors.

In the perfect insects the antennæ of the males are simple, stout, and compressed, rather serrated, pilose at the apex; those of the females slender, a little serrated towards the apex, which is acute. Head of moderate size, and very hairy; maxillæ obsolete; palpi short, and densely covered with scales, triarticulate, basal joint short, second as long as the other two, robust, the terminal one the length of the first, slender and subfusiform. Thorax and abdomen both rather robust, the latter a little tufted at the extremity in both sexes: wings deflexed; anterior elongate, subtrigonate, posterior margins rounded; legs very stout and short; thighs and tibiæ with a broad fringe of hairs; anterior tibiæ simple, the rest with spines at the apex.*

The pretty little species figured at 2, measures about an inch between the tips of the wings. Ground colour of the superior wings brown, with several deltoid green spots, arranged somewhat longitudinally, on the surface of each; hinder wings light brown, without spots. Head and thorax of the same colour as the ground of the upper wings, and the abdomen like that of the under pair.

The caterpillar (fig. 1) inclines to purple on the sides, each of which has three longitudinal yellow

* Stephens' Illus. Haust.

stripes margined on the under side with black. The central part of the back is dark, and the pointed projection brownish-red. It feeds on the dog-wood (*Cornus Florida*, Linn.), oak, and other trees. It was observed by Abbot to make its web on the 14th of September, and the moth appeared July 22. He states that it is not common, though found in Virginia as well as Georgia. It occurs also in Surinam, and probably in many other parts of America.

LIMACODES MICILIA.

PLATE XXII. Fig. 2.

Cramer, Pap. Exot., pl. 228, fig. G.

Expansion of the wings nearly two inches. Wings brilliant blue; the superior pair with a small white transparent streak towards the base, a large angular transverse white space in the middle, and an oval spot of the same description near the apex; under wings having a broad white stripe running through the middle from the base nearly to the hinder margin. The body is blue and glossy; antennæ plumose: legs red.

The caterpillar (Plate XXII. fig. 1) is thick and fleshy, and of large size compared with the perfect

insect. The greater part of the body is green, with a large saddle-shaped yellowish-grey space on the back: numerous thick spinous elevations, garnished with strong hairs, rise both from the anterior and posterior part of the body, and along the sides there is a series of smaller ones of a pink colour. The head is extremely small, and the segments are scarcely discernible viewed from above. This caterpillar feeds on the leaves of the sweet orange. It prepares a globose-oval cocoon of light yellowish-brown silk: the chrysalis is short and contracted: the butterfly comes forth from it in six or seven days.

This singular insect is a native of Surinam. It has a very close resemblance to *Phal. (Bombyx) Cœlestina* of Cramer and Stoll, from the same country, but the latter is much smaller, the colouring of the surface slightly different, and the legs are bluish-black. The caterpillar, as represented by Stoll (plate 21, fig. 2), has the greater part of the body covered by a kind of shield, of a green colour, edged with yellow, on the hinder part of which are two rounded tufts of velvet black. A considerable number of similar tufts likewise exist on the anterior segments.

1 2 Limacodes Micilia.
3 4 5 Deratifera vulnerans.

DORATIFERA* VULNERANS.

PLATE XXII. Fig. 5.

* Bombyx vulnerans, *Lewin's Lepid. of New South Wales*, pl. 4.

It is much to be wished that Lewin had supplied us with a more minute description of this insect in its different states, that no doubt might exist with regard to the place it ought to occupy, and that its generic characters might be given in detail. There can be no doubt, however, but that it belongs to the same subsection of the Arctiidæ as Limacodes, and indeed a pretty close analogy can be traced between its caterpillar and some of those of the South American Limacodes. The singular formation of the caterpillar, and the unusually thick body of the moth (a property for which the South American species are no way remarkable, although their larvæ are so massive), sufficiently justify its separation generically from the other kinds, even without adducing more minute particulars.

The sexes of the perfect insect are very much alike, the male being rather smallest, the expansion

* From δόρατιον, *hastile*, and φέρω, *fero*.

of the wings not exceeding an inch and two lines. The anterior wings are ferruginous, with a silvery margin, the surface with numerous transverse lines formed of tufts of a chesnut colour, changeable in different lights. The posterior wings are dull white; thorax and abdomen light brown.

The larva (Plate XXII. fig. 3) is of very singular aspect, broad, thick, and massive, with four reddish protuberances on the anterior part of the body, and four behind. These knobs it has the power of opening at pleasure, and darting out eight rays or bunches of little stings of a yellow colour. The general hue of the body is grey, with numerous black spots and streaks, the back with a large pale-coloured patch, marked with several curved black figures. There are likewise two reddish tufts on the head, and two others at the hinder extremity. It feeds on the leaves of the stringy bark tree of the colonists; changes to a pupa in the beginning of February, fastening itself to the stem of a leaf, and spinning a close case in the form of an egg, which it agglutinates by the moisture of its mouth into a hard crust of a brown colour, appearing like a kind of fruit hanging on the tree (fig. 4). It remains in this state twenty-two days, and is on the wing in the same month.

The wound inflicted by the little fascicles of stings is described by Lewin as very painful and venomous, and it darts them forth whenever it is alarmed by the motion of any thing approaching. They must prove a very powerful defence against birds and many other enemies. It is to be regretted

that an accurate account has not been given of the nature of these appendages, as their occurrence is so rare among this tribe of insects. It is probable, however, that the projected points are not stings properly so called, but merely sharp needle-like pieces, charged with some acrid or poisonous matter.

The arrangement and appearance of the tufts on the caterpillar of *Limacodes Cœlestina*, formerly alluded to, are so similar to those of *D. vulnerans*, that it is no way improbable that they may possess like properties. But with regard to this and other species of similar construction, this point can be ascertained only by the observation of living specimens.

ECNOMIDEA* PITHECIUM.

PLATE XXI. Fig. 4.

Bombyx Pithecium, *Abbot and Smith's Lepid. Georg.*, pl. 74.

This insect belongs to another group nearly related to Limacodes, but even of more singular aspect in the larva state, insomuch that it becomes indispen-

* From ἐκνομος, *inusitatus*, and ἰδια, *forma*; in allusion to the singular shape of the larva.

sable to assign it a new generic name, as has been done above. Altogether only three of these curious moths have fallen under our observation, and they have so many points in common, that they may be all included, at least provisionally, in the present genus. The perfect insects are in no way remarkable, but the caterpillars are furnished with long lateral appendages, commonly curved backwards, and so disposed as to take away all resemblance to a lepidopterous larva. So much is this the case, that Madame Merian, speaking of the one she has figured, says that she found this rare animal on a citron, and although it was entirely different from a caterpillar, it produced a very pretty moth. Her delineation was the first that appeared of one of these caterpillars, and it seems to have attracted so little attention, that we are not aware that even a specific name has been given to it. Stoll figured another, which he found to produce the moth described by Cramer under the name of *Phal. (Bombyx) Hipparchia* (pl. 185, fig. D). The third, which has been engraved on the accompanying plate, was figured by Abbot and Smith in their joint work on the Lepidoptera of Georgia.

All these caterpillars are rather of small size; have the head minute and retractile as in Limacodes; the body somewhat flat, and on each side are three long projecting appendages covered with hair, having a small fleshy protuberance between them terminating in a hair; and there are two other projecting pieces, of intermediate size, behind the

head, and a rather larger pair over the tail. The individual figured by Madame Merian (*Surin. Ins.* pl. 28) has the lateral appendages rounded at the extremity, and the body is mottled. She affirms that it is venomous, and that the parts of the body which it touches become stiff and inflamed; a statement which the history already given of the larva of Doraticampa tends directly to confirm. The caterpillar of *E. Hipparchia* (according to Stoll) is of a uniform light brown colour; when it changes to a chrysalis the lateral flaps are folded round it. The moth is reddish-brown, the upper wings variegated with a lighter colour, each having a round white spot beyond the middle and a narrow curved band of the same colour not far from the anterior margin.

The moth here figured, *E. Pithecium*, has the upper wings bluish, with transverse waved bands of yellowish-brown, and more or less clouded with dusky: hinder wings entirely brown, with a narrow yellow line within the fringe; body of the female rather thick, thorax and abdomen bluish, the former brown on the side, and the latter with brown rings. The body of the male is wholly light brown with clouds of a deeper colour, the abdomen tufted at the apex. The female expands an inch and three lines, the male somewhat less.

The caterpillar (Plate XXI. fig. 3) is wholly brown, the head alone being yellow. It feeds on persimmon and the various kinds of oaks. Abbot states that it is found both in Georgia and Virginia, but it is very rare. His specimen spun on the 10th

July, and the moth was produced on the 31st. The cocoon is almost globose. The name *Pithecium* has been suggested by the uncouth figure of the larva, which the author just mentioned likewise calls the Bat-caterpillar.

HYPERCOMPA? SYBARIS.

PLATE XXIII. Fig. 1.

Phalæna (Bombyx) Sybaris, *Cramer*, pl. 71, fig. E.; *Palisot de Beauvois, Ins. d'Afr. et Amer., Lepid.*, pl. 24, fig. 7.—Bombyx credula, *Fabr. Ent. Syst.*, vol. iii. part i. p. 475.

This beautiful insect is evidently closely allied to *Hypercompa dominula*, agreeing therewith in the arrangement of the wing-veins*, palpi, spiral tongue, and short spurs on the hind legs. The specimen figured by Cramer is a male, having the antennæ shortly bipectinated; that here represented is a female, with slender setaceous antennæ, each joint emitting a very short fine seta beneath.

The confines of the families Arctiidæ, Lithosiidæ, and Tineidæ are so close, that it is impossible in

* There is a slight difference in the branch of the post-costal vein, which runs to the apex of the fore wings, being simple in Sybaris, whereas it is furcate in Dominula. The shape of the wings is also different.

1 Hypercampa Sybaris.
2 Callimorpha Bidentata.
3 ——— Philetas.

the present state of our knowledge to lay down characters which shall exclusively distinguish the species belonging to each. Thus, although Mr. Curtis asserts, under Callimorpha, that a long spiral proboscis and simple antennæ, in both sexes, distinguish the Lithosiidæ from the Arctiidæ, we find the present insect possesses the long spiral tongue of the former, and the male the pectinated antennæ of the latter family.

The whole colour of this moth is black, with numerous white spots, there being twenty of the latter on each of the fore wings, and eighteen on each of the hind wings, the latter being placed in three irregular rows. The sides of the head are white; there are four minute white dots on the collar, succeeded by a row of eight on the front of the thorax; there are also two on the scutellum, and the apex of each of the lappets is white; there are also two on the postscutellum, and four on each of the abdominal segments.

The specimen here figured is from St. Domingo, and is contained in the collection of the Reverend F. W. Hope.

The expansion of the wings is two inches and a half.

LITHOSIIDÆ.

This family was proposed by Stephens for the reception of a few moths, which he characterises as having the antennæ moderate, very slender, setaceous, sometimes pectinated or ciliated in the males; palpi not longer than the head, cylindric, terminal joint as short as, or shorter, than the second; spiral tongue generally longer than the head; wings horizontal, somewhat elliptic, the posterior much folded, the anterior without stigmata, thorax not crested, body slender. The larva is fusiform, sometimes hairy, with sixteen legs, solitary, either residing in a common web, or subcutaneous.

This family is of limited extent, but the species are generally of great beauty; their gay colours emulating those of butterflies, which they resemble by flying occasionally in the day, although the twilight is their proper season of activity. It is difficult to determine their true relations, for they seem to touch upon different families according to the point of view under which they are regarded. Linnæus referred such as were known to him either to the Tineæ, Bombyces, or Noctuæ, and they exhibit peculiarities which render such a distribution not unnatural, although they are now included in one group.

CALLIMORPHA HELCITA.

PLATE XXIII. Fig. 2.

Pap. Helcita, *Linn.*—Phalæna macularia, *Fabr.*; *Drury*, *Exot. Ent.*, vol. iii. pl. 29, fig. 4.

We had occasion in a former volume to notice some of the British species of this beautiful group, and we now describe two examples of exotic forms. The genus is very closely allied to the Arctiidæ, through Hypercompa, and may be briefly defined as having the antennæ, in the male, subciliated; palpi three-jointed, the second and third joints nearly equal; the fore wings subtrigonate, and not showing any tendency to become truncate.

The species here figured was at first placed among the Papiliones by Linnæus in his *Syst. Nat.* (2. 763. 94), and it must be admitted to bear a great resemblance to some of the diurnal tribes, particularly certain kinds of Danais, in the nature and brilliancy of its colours. The expansion of the wings is about three inches and a half: head, thorax, and abdomen deep black, the two last marked with three rows of white spots, one on the back and another on each side. The upper wings are of a beautiful deep red, the whole of the exterior part from a little beyond the middle black, with a curved row of pretty large

white spots in its centre, the anterior ones, which are largest, having a tendency to run together. The under wings are of the same colours as the upper, the hinder margin with a broad black border, in which is placed at regular intervals a row of eight oval white spots. Antennæ black and setaceous; palpi yellow; abdomen likewise yellow on the under side, the breast and legs marked with white.

This insect is accounted very rare, and is therefore highly prized by collectors. It is said by Drury, on the authority of Mr. Smeathman, to be a native of Sierra Leone; Linnæus simply says "*ab Indiis;*" and Fabricius mentions India, which is in all likelihood a mistake, if he meant to indicate any thing else by the use of that word than that the species was exotic. Mr. Smeathman states that it is found in the Savannahs, and so inactive in its motions that it is easily taken.

CALLIMORPHA PHILETA.

PLATE XXIII. Fig. 3.

Phalæna (Noctua) Phileta, *Drury, Exot. Ent.*, iii. pl. 22, fig. 5.

EXPANDS two inches and a half. Antennæ black: head and thorax deep red, the latter with several black spots and streaks. Upper wings entirely black, crossed by a white band a little beyond the

middle. Posterior wings yellow, margined externally with black; abdomen likewise yellow, with black streaks running across. Legs black, marked with white.

This, like the former, was brought from Sierra Leone by Mr. Smeathman.

DEIOPEIA BELLA.

PLATE XXIV. Fig. 1.

Phalæna (Tinea) bella, *Linn.*; *Fabr.*; *Cramer, Pap. Exot.*, pl. 109, fig. C. D. — Deiopeia bella, *Westwood's Drury*, i. pl. 24, fig. 3.

In our volume on British Moths, we figured the only native species of this pretty genus which we possess, and as the generic characters are there specified, they need not be repeated in this place. They are insects of rather delicate structure, below the middle size, and generally displaying fine tints of crimson or yellow with small spots of white. Many of them are natives of the New World, but they are likewise extensively distributed over the old continent. The species here figured is found in the neighbourhood of New York and other parts of North America. It expands about an inch and

nine lines: anterior wings fine yellow, traversed with several narrow irregular white bands, with a series of black dots in each, and a regular row of black dots on the outer margin; the fringe pure white. The hinder wings are scarlet, irregularly margined with black behind; the fringe white. The thorax and abdomen are nearly white, the former spotted with black; antennæ of the latter colour.

D. ORNATRIX.—Superior wings flesh-coloured, the anterior border scarlet with four white spots having a black dot in each, a regular row of black dots not far from the exterior margin, within which are a few scarlet streaks: there are likewise a few scarlet streaks near the base, with one or two black dots: hinder wings white, with a black border behind emitting broad patches internally: thorax spotted. Expansion one inch nine lines. —*Phal. ornatrix*, Linn.—*Bombyx orn.* Fabr., *Drury*, i. pl. 24, fig. 2.

D. ASTREA.—Whole surface fulvous; anterior wings with seven transverse white bands spotted with black; hinder wings with pretty large scattered black spots; neck with two black spots, thorax with four, abdomen with three rows. Expansion one inch seven lines.—*Phal. astrea*, *Drury*, i. pl. 6. fig. 3.—*Phal. Geom. cribrata*, Gmel.—Gold Coast, Africa.

1. Deiopeia bella. 2. Cydosia nobilitella.
3. Chloridea Rhexiae. 4. Alaria(Erastria) Gaurae.
5. Caterpillar of Do.

CYDOSIA NOBILITELLA, *Westwood.*

PLATE XXIV. Fig. 2.

Phalæna nobilitella, *Cramer, Pap. Exot.*, Plate 264.

This lovely insect belongs to the present family, from the majority of which, however, it offers a marked distinction in the splendour of its colours, whilst the arrangement of the veins of the wings appears to differ from all the rest. It seems doubtful also whether the wings are convoluted when at rest. The head, setaceous antennæ, small palpi closely applied to the lower part of the face, elongated spiral tongue, and feet, agree with the typical Lithosiæ. The medial vein of the fore wings has the terminal branches all arising close together at the extremity and at a great distance from the first branch, and there are three * terminal branches as in many of the Tortricidæ (such as *Cnephasia longiana*, Curtis, pl. 100, f. 9); but the terminal branches of the postcostal vein are similar to those of *Lithosia quadra*, except that the third branch anteriorly emits two branchlets, whereas in Lithosia

* In *Lithosia complana* there are only two terminal branches.

it emits a single branchlet, which is furcate; moreover, the vein connecting the postcostal and medial veins in the middle of the wing is incomplete, so that the great cell is posteriorly open.

The wings are shining, the anterior steel-blue, each with about fourteen white marks of variable form arranged thus 1 3 3 3 . 1 . 3; besides which there are several minute white dots near the apex of the wing; there is also a rich shining orange spot on the costa, near the base, and three transverse bars of the same colour between the white spots: the hind wings are white, with a broad black margin; the thorax is steel-blue, with six white spots; the tippets have an orange spot at the base, with the apex white; the scutellum has also a white spot; the abdomen is steel-blue; the legs are black, with white marks.

Cramer's specimen was from the island of Curaçoa. That here figured is from the island of St. Domingo, and is contained in the cabinet of the Rev. F. W. Hope. The expansion of the wings is one inch and a quarter.

NOCTUIDÆ.

The present family is a very natural one, corresponding to the section *Phalæna noctua* of Linnæus, and containing no fewer than about eight hundred European species, and four hundred British, besides exotics. The genera already established are very numerous, and in many cases founded in such minute structural differences, that they cannot be recognised without great difficulty. The antennæ are simple and setiform, very rarely pectinated or ciliated in the males; the body short and stout, the thorax being often crested; the mouth is well developed, the spiral tongue long, the palpi projecting, and in general having the terminal joint naked, at least at the tip. The wings are usually deflexed, or folded on each side of the body, when in a state of repose, but frequently they are horizontal, and partly expanded. The caterpillars are very diversified, generally solitary, not residing in a web, and apparently in no case subcutaneous. For the most part they have sixteen feet. The pupa is never suspended, and is almost always buried in the earth.

EREBUS CREPUSCULARIS.

PLATE XXV. Fig. 1.

Phal. (Attacus) crepuscularis, *Linn.*, *Drury's Exot. Ins.*, vol. pl. 20, figs. 1, 2; *Cramer, Pap. Exot.*, pl. 159, fig. A.

This genus, which corresponds to that named Thysania, by Dalman, was established by Latreille, for the reception of a group of exotic moths, which he was of opinion should be separated from the Noctuidæ. They bear the wings always extended and horizontal, and the last joint of the palpi is long, slender, and naked. The genus comprises some of the most gigantic moths with which we are acquainted; in particular, the *Erebus strix*, or great owl-moth of Brazil, which measures about a foot from tip to tip of the expanded wings. The caterpillar of this superb moth, "the glory of the Noctuidæ," as it is termed by Kirby, is of a black colour, with transverse green bands and a lateral stripe, bearing pretty long tufts of fine hair, and having an anal horn like the larva of a sphinx. (See Merian's Surinam Insects, pl. 20.) Not greatly inferior in size is the *E. odora*, which occurs in many of the West Indian islands. The prevailing hues among them are very dark, and they are frequently

1 Erebus crepuscularis.
2 Triphaena materna.

ornamented with circular marks and waved transverse lines of a lighter colour.

That which we have figured affords a very characteristic example of the group: it is a native of the East Indies. The anterior wings are dark brown at the base, but lighter towards the tip; near the middle there is a pale bar, which runs obliquely to the middle, when it suddenly bends and runs to the anterior margin; just within it there is a large eye-like mark; not far from the margin there are several dark and light-coloured spots. The under wings are buff colour at the base, the rest rich brown, and crossed by two undulating lines of deeper brown, accompanied with a streak of buff. On the under side all the wings are pale clay colour, inclining to buff, and there is a transverse irregular series of light-coloured marks, a large one towards the tip of the upper wings, and another on the disk. The edges of all the wings are deeply scolloped. The body is of the same colour as the wings, and without markings.

The example of this insect figured by Drury, which he states to have come from China, is a variety.

CHLORIDEA RHEXIÆ.

PLATE XXIV. Fig. 3.

Phal. Rhexiæ, *Abbot and Smith, Lepid. Georg.*, pl. 100.

The insect to which we have applied the above generic name is apparently allied to Xanthia of Curtis, but not only differs in the character of the colouring, but in several other respects. The upper wings are long, rather narrow, and triangular, the outer margin rounded, and having no tendency to a subfalcate shape; the thorax robust and crested. The caterpillar has eight abdominal and two anal, besides the usual number of pectoral legs. Not having had an opportunity of examining specimens, we cannot enter into the examination of the minute parts of structure.

The moth is very finely coloured, and bears some resemblance, in that respect, to our native *Tortrix prasinana*. The upper wings are green, with three transverse stripes of yellow, a kidney shaped mark on the disk, and a smaller rounded one before it; thorax green; abdomen and hinder wings white, tinted with reddish-brown, the colour becoming

deeper towards the hinder margin of the wings; antennæ also reddish.

The caterpillar is dull yellowish-green, having a narrow white line along the sides, and a yellow one a little above it, and there is a small reddish spot on each segment between these lines. It eats the buds and blossoms of the *Rhexia Virginica*, as well as those of the tobacco plant, proving often very pernicious to the latter by destroying the main shoot. The only method employed to get rid of it is to throw hot sand or wood ashes upon the plants; sometimes also the caterpillars are picked off with the hand. Abbot found one of the individuals he kept enter the ground and spin a web there on the 25th July, and the fly came out on the 9th August. The insect is a native of Georgia, but is not common.

ALARIA GAURÆ.

PLATE XXIV. Fig. 4.

Phal. Gauræ, *Abbot and Smith, Lepid. Geog.*, pl. 99.

This delicately tinted moth has some relation to the preceding, but seemingly not so close as to warrant its being included under the same generic appellation. The ground colour is white, the wings tinted with red, that colour deepening at the exterior margin of the upper pair, and forming a transverse band beyond the middle not reaching to the hinder extremity; thorax crested, inclining to yellow.

The caterpillar (fig. 5) is rather long and slender, having sixteen feet; the under side of the body and legs white, the rest yellow, each segment with a transverse black band in the middle; head ferruginous. It feeds on the *Gaura biennis*. When the moth settles on the blossoms of that plant, there is such a similarity between its colours and those of the flowers, that it is scarcely possible to distinguish them at a small distance.

TRIPHÆNA MATERNA.

PLATE XXV. Fig. 2.

Phal. Noctua materna, *Linn.*—Noctua hybrida, *Fabr.*, *Cramer*, *Pap. Exot.*, pl. 267, fig. E.; *Drury*, *Exot. Ins.*, vol ii. pl. 13, fig. 4.

TRIPHÆNA may be briefly defined as having the fore wings bistigmatiferous, the palpi ascending, the wings incumbent and entire, the thorax not crested, the body flat, and the antennæ simple. It contains a considerable number of well known and conspicuous British moths, which are commonly called yellow under-wings; and it will be seen from the specimen here figured, that the foreign species bear a striking resemblance to them.

T. materna expands about three inches and a half; the antennæ are setaceous, the palpi yellow, with blue tips; the head is likewise tinged with blue. The anterior wings are light brown, mottled with grey and green, the surface glossy, and the tints changing according to the direction in which the light falls on them. Posterior wings yellow, each of them with a round black spot in the centre; the posterior border likewise edged with black, the inner margin of the band dentate, and the exterior

one interrupted with a series of small white spots. The thorax is olive and the abdomen yellow. On the under side the anterior wings are yellowish, the tips brown, and there is a black streak running from the lower corner to the posterior edge; the under side of the posterior wings nearly like the upper.

Cramer states that his specimens are both from the coast of Coromandel and Surinam (?). Drury obtained it from Bengal.

CATOCALA NEOGAMA.

PLATE XXVI. Fig. 1.

Abbot and Smith, Lepid. Georg., vol. ii. pl. 88; *Oliv. Encyc. Method*, p. 291.

THE characteristic features of this genus have been described at length, in giving the history of certain of the species occurring in Britain.* The foreign species are numerous, but none of them exceed in size or beauty our own rare *C. Fraxini*. They are natives of temperate climates. The caterpillars are called half-loopers, that is, they curve upwards a

* Nat. Lib. Brit. Moths, p. 242.

1. 2 Catocala neogama
3. ——— amesta

portion of their body when walking, after the manner of the geometer caterpillars, thus indicating an affinity, and forming a passage from the Noctuidæ to the Geometridæ. The caterpillars generally feed on a great variety of plants. The chrysalides are often remarkable for their fine lilac or bluish colour, appearing as if covered by a kind of bloom.

Expansion of the wings, in *C. neogama*, about three inches two lines. Head and thorax grey, the latter with transverse dark lines in front. Upper wings variegated with brown, ash-grey, and white, and marked with numerous flexuose black lines, most of them running obliquely across the wings; there is an ear-shaped spot in the centre, and a pretty regular series of small dark spots not far from the exterior margin. Hinder wings yellow, each with two black bands, irregular on their edges, and neither reaching to the abdominal margin, the exterior one broadest, and the other not recurved; abdomen yellow.

The caterpillar (Plate XXVI. fig. 2) is reddish-brown, with two darker lines near the back, and a series of dark spots along the sides. It feeds on the black American walnut (*Juglans nigra*, Linn.), and like others of its tribe, when done feeding, it descends from the leaves to the body of the tree, and stretches itself along the bark, to which it bears so much resemblance in colour and surface, as to be scarcely distinguishable from it. The perfect insect appears in June, and is found in Georgia and other parts of America.

The strong resemblance which many of the yellow under-wings, as these moths are called, have to each other, has rendered their synonomy somewhat complex and confused. The species just decribed has been thought not to be specifically distinct from the Linnean *Ph. paranympha* (figured by Roesel, iv. pl. 18, figs. 1, 2), but it is of much larger size, the wings are more evidently dentated, the outermost black bar on the under wings is uninterrupted, and the inner one is not recurved anteriorly and continued along a portion of the abdominal margin. It is likewise nearly related to *Catocala affinis* (*West. Drury*, vol. i. pl. 23, fig. 6), which is a native of New York, but is at once distinguished from that species by its yellow abdomen, and having a yellow space along the margin exterior to the black band on the under wings.

CATOCALA AMASIA.

PLATE XXVI. Fig. 3.

Abbot and Smith, Lepid. Geog., vol. ii. pl. 90; *Oliv. Encyc. Method.*, p. 290.

Considerably less than the preceding, the wings expanding little more than two inches. Head and thorax light grey; abdomen yellow: upper wings variegated with ash-grey and white, the surface variously marked with dark spots and transverse streaks; in the centre there is an ear-shaped mark, and towards the exterior margin a dark zigzag line with a row of fulvous spots within it. The under wings are yellow, with two curved black bands, the innermost one narrow and not reaching to the abdominal margin, the exterior one broad and interrupted near the anal angle; the fringe yellow, slightly clouded with dusky.

The caterpillar is grey, with darker lines along the sides. Its most common food is the various kinds of American oaks; Abbot found it also on the Bead-tree, or Pride of China (*Melia azedarack*, Linn.). The author just named found that it spun among the leaves in the beginning of May, and came out near the end of that month. He adds,

that the moth may be often found sitting on the trunks of large oaks, and that it is a native of Virginia as well as of Georgia. The chrysalis is of a delicate lilac tint. (Plate XXVI. fig. 4.)

The most common of the American yellow underwings is the *Phal. consors* of Abbot and Smith (pl. 89), which is somewhat intermediate between the two just described. It measures two inches and three-quarters between the extremities of the fore wings; the surface of these is greyish brown, with several angular dark lines and ferruginous marks running across; under wings yellow, with two continuous black bands, very irregular on their edges, extending to the abdominal margin; the male with black spots on the back of the basal segments of the abdomen. The caterpillar frequents the bastard indigo (*Amorpha fruticosa*, Linn.). America likewise possesses a species nearly allied to our *C. Fraxini*, namely, *C. Vidua* (Abbot and Smith, pl. 91), but it is smaller than the European insect, and wants the broad bluish band across the disk of the hinder wings.

GEOMETRIDÆ.

This family admits of a more explicit definition than most of those previously considered. Although it is not in the perfect insect that the most marked peculiarities appear, we can seldom fail at once to recognise them, even in that state, by their general weakness of appearance, attenuated form of body, and comparatively ample expanse of wing. But the singular mode in which the caterpillar advances over a surface, as if measuring it by successive spans, is the most distinguishing peculiarity, and has suggested the name. In typical examples they have three pair of pectoral legs, a single pair of abdominal prolegs, and a pair of anal ones. With the two latter of these they fix themselves to the plane of position, then move the body forwards as far as possible and rest on their pectoral legs, when the hinder part is drawn forwards to the head and the body curved upwards into a kind of loop; the same process is again repeated, and a rapid progression thus effected. "Their muscular power is very great, and hence their positions during repose are striking. Fixing themselves by their anal feet alone, they extend their bodies in a straight line, holding them in that position for a great length

of time. This, together with their obscure colours, and the warts which their bodies exhibit, renders it often quite difficult to distinguish them from twigs of the trees on which they feed. They feed on the leaves of various trees and plants, and have the instinct, when alarmed, of dropping down from the leaves, and suspending themselves by a thread, which enables them to remount when the danger is past. The chrysalides are either naked and suspended by the tail, or enclosed in a very slender cocoon, which is rarely subterraneous, and oft-times placed amongst dry leaves, &c." *

"We have numerous species in Britain, many of them very agreeably adorned. The foreign species are also very numerous, but none of them attain a large size.

* Westwood's Modern Class. of Insects, vol. ii. p. 397.

1 Asthena pedaliriaria 2 Macrotes netrix.
3 Venilia Sospita 4 Eumella Rosalia.

ASTHENIA PODALIRIARIA, *Westwood.*

PLATE XXIX. Fig. 1.

In supplying us with a figure of this new species, Mr. Westwood has suggested the propriety of referring it, along with several others, to a new genus, which he names Asthenia. The species approach our English *Ourapteryx sambucaria* in general form and in the hind wings being tailed. From that genus, however, they differ in having the antennæ short and strongly bipectinated, and the legs as well as the body very short and weak. The fore wings are triangular, not falcate at the tip, the external margin forming nearly a straight line. The veins of the fore wings are arranged as in Ourapteryx, except that the branches both of the postcostal and medial veins arise much closer to the base of the wings. The hind wings are much more decidedly tailed than in *O. sambucaria;* the postcostal vein emits three branches, independently of the mediastinal vein, whereas in *O. sambucaria* the postcostal sends off only two branches.

The general colour of *A. podaliriaria* is very pale cream-colour, the fore wings having three transverse narrow brown bars across them, the first before the middle, the second behind the middle (interrupted

towards the posterior margin), and the third close to the outer margin: the apex of the wings is marked by a large blackish patch. In the hind wings the three bars are also continued across the surface, meeting at the anal angle; the first straight, the second angulated over the tail, and the third forming an arch over the base of the tail, which has two black spots, the outer one with an external orange stripe; the tail slender and curved. The antennæ are black. Expansion of the wings one inch and three-quarters.

This species is from Rio Janeiro, the specimen figured being in the collection of the Rev. F. W. Hope.

The following also belong to this genus:—

A. MACHAONARIA.—Light cream colour; upper wings with three uninterrupted brown bars, the outermost midway between the middle of the wing and the exterior margin; the apex with two small oblique brown stripes: under wings traversed by two brown bars, recurved to the internal margin, and having a narrow waved line between them; tail angular and acute, with two pear-shaped black spots, surmounted by a short waved brown bar. Expansion of the wings two inches.—*Guerin, Icon. des Insectes*, pl. 90, fig. 1.

A. GEMINIA.—Cream colour, nearly white; upper wings with three transverse brown bars, the second not reaching to the posterior edge, and the third, which is placed close to the margin, not extending to the apex; the latter unspotted; costa marked with short black lines. The first and outer bar of the upper wings are continued across the under pair, meeting at the anal angle; the external one margined with black, and the tail itself

marked with two large black spots. Expansion two inches seven lines.—*Cramer, Pap. Exot.*, pl. 133, fig. C. —A native of Amboyna.

A. LATUCINA.—Wings cream colour, with two brown bands, somewhat in the form of a W; the outer one zigzag, and having a lighter brown stripe behind it: tail with three black spots. The under wings have a small round black spot towards the base of each, and the whole of the exterior region of the wings is sprinkled with minute brown dots. Expansion two inches and a half. *Cramer, Pap. Exot.*, pl. 273, figs. B. and C.—Cramer's specimen was from Surinam.

MACROTES NETRIX, *Westwood.*

PLATE XXIX. Fig. 2.

Phalæna netrix, *Cramer*, pl. 151, E.

This moth, remarkable for the great length of the antennæ, legs, and abdomen, belongs to the Geometridæ, agreeing with various species of that family in the subfalcate and angulated form of the wings. The head is small; the palpi about as long as the head, and compressed. The antennæ as long as the body, and strongly bipectinated to the tips in the males, but simple in the females (if it be correct to refer this species to Cramer's figure above cited). The fore wings are long, slightly falcate at the tips, and angulated in the middle of the outer margin; the hind wings are somewhat lozenge-shaped, with the margins scolloped, and strongly angulated in the middle. The abdomen is exceedingly long, as are also the anterior tarsi, which are very slender, with a small tuft of scales on the outside, close to the bar, where the joint is slightly curved. The femora and tibiæ of the fore legs are short, the former with long slender hairs beneath, and the latter with fascicles of scales. The hind legs are wanting

in the specimen now described. The general colour is pale buff, with rather darker brown shades and dots, some of the latter being larger and more distinct, especially one near the bar of the costa, another above the middle, and two close to the tip of the fore wings, which are also slightly marked with three faint transverse fasciæ at equal distances apart; the costa at the base, and cilia, are purplish. The hind wings have an angulated vitreous discoidal spot, margined with black, with a purple patch between it and the costa; behind this is a curved row of dark dots on the veins, and the anal angle is also purplish, as are also the anterior tibiæ and the patch of scales at the base of the anterior tarsi.

The specimen figured is in the collection of the Rev. F. W. Hope. Its locality is unknown.

The expansion of the wings is two inches and one-third.

VENILIA SOSPETA.

PLATE XXIX. Fig. 3.

Phalæna sospeta, *Drury, Exot. Ins.*, vol. ii. pl. 22, fig. 3.

This pretty species is referred with some doubt to Duponchel's genus Venilia, which is characterised by having the wings deltoid in repose, the hinder margin of the anterior pair excised, the posterior subemarginated; palpi short; spiral tongue long; antennæ simple.

The expansion of the wings is about two inches five lines, their colour pale yellow; the anterior with several brown spots, which have a tendency to form two very irregular macular bands; on the hinder wings there is likewise a large transverse brown spot near the abdominal margin. The head is pale yellow; thorax and abdomen yellow, the former shading into brown posteriorly. On the under side the breast and abdomen are pale yellow, the markings on the wings corresponding to those on the surface. Legs yellow, spotted with brown.

This geometer is a native of Jamaica.

EUMELEA * ROSALIA.

PLATE XXIX. Fig. 4.

Phal. Geometra Rosalia, *Cramer, Pap. Exot.*, pl. 368, fig. F.

We have been unable to refer this finely coloured moth to any of the existing genera, and have therefore given it a generic appellation expressive of what seems to be its most remarkable feature, namely, the great length of the legs and antennæ. The former are very long and robust, when extended reaching to the very apex of the wings, and the antennæ, which are simple, are of corresponding dimensions. The spiral tongue is developed and of some length. The wings are pretty ample, the apex simple and rounded; their colour, entirely a deep rose red, changing with the light, and marked with many slender transverse yellowish striæ.

The locality is unknown.

From *ευ*, *bene*, and *μιλια*, *membra*.

ANGERONA PRUNARIA.

PLATE XXVII. Fig. 1.

Phal. Geom. prunaria, *Linn.* — Hipparchus prunaria, *Leach, Samou., Curtis.*—Angerona prunaria, *Duponchel.*

We have been induced to figure this interesting specimen of a well known European geometrine moth (occurring also in this country), for the purpose of exemplifying a phenomenon perhaps more frequently observed among this tribe of insects than any other, namely, what is called Gynandromorphism, or the union of both sexes (at least in external features) in the same individual. In this instance the whole right side is that of a male and the left that of a female, insomuch that one would say some person had been amusing themselves by attaching the wings in this manner; but the impossibility of observing the suture at the point of junction soon convinces us that there has been no artifice in the case, and that Nature alone has produced this anomalous union. In truth, such occurrences are not very rare, and various lists of different kinds of Gynandromorphism have been published by authors. The example here figured is called *semi-lateral gynandromorphism*, and is the most common kind

1 Angerona prunaria.
2 Alcis sordopacea

of it. In *Angerona prunaria*, the abdomen was dried up in consequence of the specimen having been long preserved, so that it was impossible to determine whether the peculiarity extended to the internal organization. In a specimen of *Melitæa didymus*, however, which admitted of dissection, the male organs were found complete and in their usual condition, and there was an ovary placed on the left side, having no connexion with any other organ. Another kind of Gynandromorphism is called *superimposed*, the sexual characters not being disposed transversely but according to the longitudinal axis of the body, whence two combinations result, the male parts being anterior, and the female posterior, or *vice versa*; this is of rare occurrence, and has been noticed only in a kind of ichneumon. Crossed Gynandromorphism, is when each side of the body presents at the same time the characters of the two sexes. This combination is rare, although much less so than the preceding. It has been observed in a *Bombyx castrensis*, in which the left antennæ and the right wings were female, the right antennæ and left wings male.[1]

[1] Lacordaire, Intro. à l'Entom., vol. ii. p. 434.

ALCIS SCOLOPACEA.

PLATE XXVII. Fig. 2.

Phal. Noct. scolopacea, *Drury, Exot. Ins.*, vol. ii. pl. 22, fig. 1. —Alcis, *Curtis.*—Boarmia, *Treit.*

THE above is a very fine foreign example of a genus containing a good many British moths, which, according to Mr. Curtis, may be distinguished from *Bupalus*, to which it is nearly related, by the males being invariably smaller than the females; the eyes larger, not so distant in front; the palpi more porrected, shorter, and not hairy, the maxillæ very long, the antennæ not pectinated at the apex. The posterior legs are long, robust, and hollow, furnished with two pair of spurs, a longitudinal suture, and a tuft of long silky hair arising at the base, and concealed in the tibia when at rest. Many Lepidoptera have their legs, especially the posterior, furnished with brushes of hair, but in no instance are they more curiously disposed than in Alcis. It is conjectured that they are designed to assist in balancing the body when in flight.

A. scolopacea is a native of Jamaica; measuring nearly three inches and a half between the tips of

the wings. The whole colour is brownish-grey. The wings are crossed by numerous waved lines, contrasted with light brown and ash colour, and marked pretty thickly with small dark brown speckles. On the under side, the colour inclines to light greyish-yellow; nearly the half of the anterior wings marked with faint brown lines and streaks, and the posterior with a faint brown cloud. The individual figured is a female.

EPIDESMIA TRICOLOR, *Westwood.*

PLATE XXVIII. Fig. 1.

We refer this insect to the family of Pyralidæ, on account of its general structure, although the arrangement of the veins of the wings differs from that of any of that family, having somewhat of a similar shape, with which we have compared it.

The body is slender; the head small; the antennæ long, slender, and filiform; the palpi nearly three times as long as the head, compressed, slender, attenuated to the tip, bent downwards; the spiral tongue long; the fore wings large and somewhat triangular, with the apex acute and slightly falcate. The mesial vein of the fore wings emits three branches, the third of which is connected by a slender vein with the inner branch of the postcostal vein, a simple longitudinal vein extending from the base of the wing to the extremity through the middle of this cross vein; the first and second branches of the postcostal vein are not extended to the costal margin of the wing, but form small oblong cells; the hind wings are large, with the outer margin slightly emarginate; the abdomen is slender, but rather thicker towards the extremity;

1 Epidesmia tricolor
2 Scopelodes unicolor
3 Tortrix Crameriana

the legs are long and slender, the coxæ of the fore legs being elongated.

The fore wings of this insect are brown, with a cream-coloured bar running nearly across the centre, but directed towards the anal angle; the inner edge of this bar is nearly straight, but the outer edge is strongly angulated behind the middle. The hind wings are also brown, with a large orange discoidal patch, nearly round in form. The cilia at the outer angle, both of the fore and hind wings, is white; the body is brown, with the abdomen cream-coloured.

The species inhabits New South Wales. The only specimen we are acquainted with is in the collection of the Rev. F. W. Hope. The expansion of the wings is two inches and three-quarters.

SCOPELODES UNICOLOR, *Westwood.*

PLATE XXVIII. Fig. 2.

It is not easy to decide on the natural situation of this curious but plain-coloured moth, although the elongated palpi and slender antennæ seem to indicate a relation with the Crambidæ; it must, however be very remote. Its general appearance is rather that of the female of *Odonestes potatoria* than any other moth, somewhat agreeing with that species in the broad oval wings.

The head is rather small, but the eyes are large; the palpi are very long, forming a thick clavate brush of hairs; the maxillæ are almost rudimental, forming a very short flat tongue; the antennæ are short and slender; the wings are short and broadly ovate, the anterior rather acute at the apex, from which point to the base the hind margin of the wing forms a regular curve. The postcostal vein is at a considerable distance from the mediastinal one, and anteriorly emits three branches, the third of which is furcate, the apical point of the wing being included between the fork; the medial vein emits three branches, and there are two longitudinal veins (extending from the vein which connects the post-

costal and medial veins) between the last branch of the medial vein and the main or fourth branch of the postcostal vein. There appears to be no bridle to hook the wings together. The thorax is short and thick, as is also the abdomen. The legs are of nearly equal length, and very woolly, the spurs of the hind legs being almost concealed. The tarsi are long and thick and very woolly, the tarsal unguis and large flat pulvilli being concealed above by curved black hairs. When at rest, the wings are deflexed at the sides of the body, like the roof of a house. The colour of the entire moth is buff, the wings having a silky gloss, and the palpi have a pale ring near the apex; the back of the abdomen is rather more fulvous, and marked with short black bands.

It is an inhabitant of Java, and is in the collection of the Rev. F. W. Hope.

The expansion of the wings is two inches and three-quarters.

DICHROMA EQUESTRALIS.

PLATE XXX. Fig. 1.

This genus has been established by Mr. Westwood for the reception of some pretty moths, of moderate size, brought from the Cape of Good Hope by Robert Templeton, Esq., R. A., and presented by him to the Museum of the Natural History Society of Belfast. When at rest, the wings are reflexed at the sides of the body; they are rather elongate and subtriangular, the extremity being slightly acute. They are distinguished by having the ground colour of a uniform tint, but marked with numerous more or less confluent spots and lines of a silvery white colour. This contrast has suggested the generic name given above: the head is of moderate size, with the antennæ rather short and bipectinated in the males, the pectinations being rather short; in the females they are simple: the palpi are rather short, but are visible in front of the head, when seen from above. They are thickly clothed with scales to the tip, and ascend upwards to about the height of the middle of the eye. The spiral tongue is long and convoluted. The body is slender, and not thickly clothed with hairs. The anterior feet

1 Drehroma equestralis
2 ——— histrionalis
3 ——— arenalis

are rather short, the tibiæ being considerably shorter than either the femur or tarsus; the middle tibiæ are longer and terminated by two spurs, whilst the hind pair, of equal length, have a pair of spurs at the middle and another at the tip. The mediastinal vein of the fore wings is rather short: the postcostal one emits two branches before the junction with the ordinary transverse vein; the first of these branches is straight and extends to the costa of the fore wings, but the second coalesces with the postcostal vein at a short distance beyond the junction of the postcostal and transverse veins, but almost immediately branches off again in a straight line extending to the costa; a third branch is also emitted, which is forked before it reaches the costa, the lower branch of the fork extending to the tip of the wing. The median vein extends in three branches to the extremity of the wing, the ordinary transverse vein arising at the base of the last three branches. This transverse vein emits two straight veins, which extend to the extremity of the wings. The bridle consists of several very fine setæ.

We are so completely ignorant of the character of the smaller exotic Lepidoptera, that we shall only venture to observe, respecting the relations of this group of moths, that they seem to be intermediate between the Lithosiidæ and aberrant Tineidæ.

The head, thorax, and fore wings of *D. equestralis* are of a beautiful pea-green, the latter being ornamented with numerous spots and lines of silvery white, more or less confluent; three of these

are close to the base of the wing, succeeded by a deeply angulated bar. The middle portion of the wing is marked with eight or ten white spots, the middle ones being elongated and corresponding with the situation of the branches of the median vein; then follows an oblique bar, strongly angulated in the middle, extending from the apex to the inner margin of the wing, and emitting on the outside eight straight branches which extend to the outer margin of the wing. The head, wings, and body are of a silvery white, slightly shaded with brown. The expansion of the wings is fourteen lines and a half.

DICHROMA HISTRIONALIS.

PLATE XXX. Fig. 2.

The head is white, with a patch of fulvous on the crown; the thorax white, ornamented with fulvous. The fore wings are of a splendid golden fulvous hue, ornamented with many silvery white marks, strongly relieved by being edged with black scales; the fore margin of the wings is also white. At the base of the fore wings are two divergent white bars, the anterior of which is strongly forked; the upper bar of the fork abbreviated and succeeded by an oval patch; across the middle of the wing, in an oblique direction, are four oval white patches, the anterior being, as it were, duplicated; then follows an oblique white bar, broken in the middle, from the outside of which several straight white bars extend to the outer margin of the wing. The hind wings and abdomen are of a silvery white, slightly shaded with brown.

The expansion of the fore wings is twelve lines and a half.

DICHROMA ARCUALIS.

PLATE XXX. Fig. 3.

The fore wings in this species are of a dirty and rather pale brown colour, ornamented with white markings; near the base of the wing is a strongly furcate mark, the anterior branch of which is dilated; parallel to the inner margin of the wing is a white slender bar, which is connected near the middle of the wing with a series of white crescents placed obliquely, and extending upwards to the middle of the wing, above which is a clavate spot; beyond this, and extending in an oblique direction to the tip of the wing, is a strongly denticulated white line; and there is a row of white arches along the outer margin of the wing, diminishing in size as they extend towards the apical angle. The hind wings and abdomen are white, slightly tinged with brownish.

The expansion of the fore wings is one inch.

TORTRIX CRAMERIANA.

PLATE XXVIII. Fig. 3.

Cramer, Pap. Exot., pl. 348, fig. I, K.

This prettily coloured Tortrix is named in honour of the ichnographer, to whose valuable works we have so often had occasion to refer in the course of the preceding pages. It is a native of Surinam.

THE END.

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